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NEW I.T.
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Kevin Mitnick did five years for hacking. Now he's out, and you want to hire him.
Here's how to manage the risk. PAGE 72

PRO AND CON

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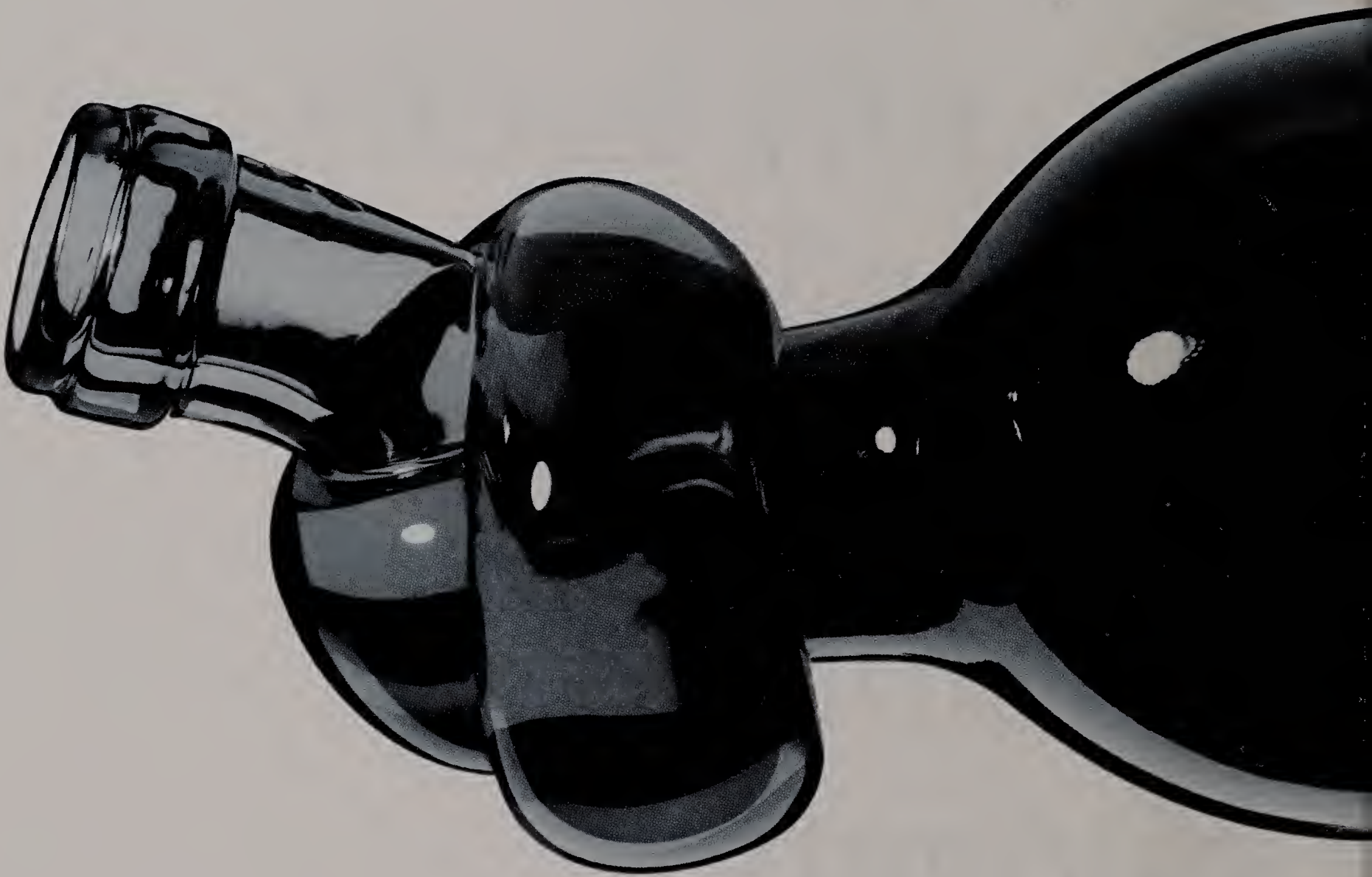
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Cover photo by Michael Kelley



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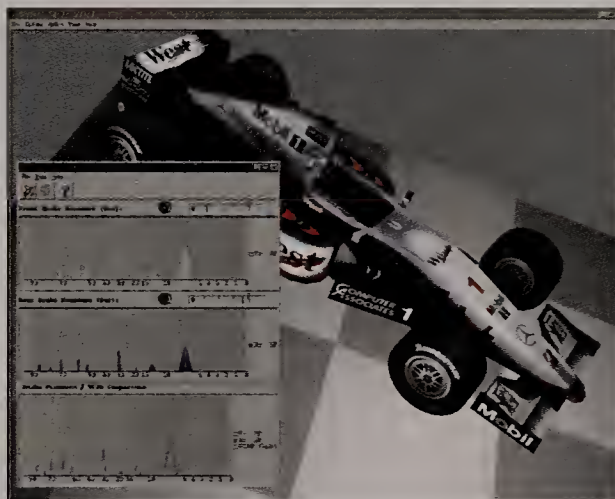
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“One of the best ways to become an inspirational leader is to study those who are. Better yet, work for one and learn from her.”

—Patricia Wallington 66



CORIO

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SECRETS TO SUCCESS: No. 135

George Bell, President, Excite@Home

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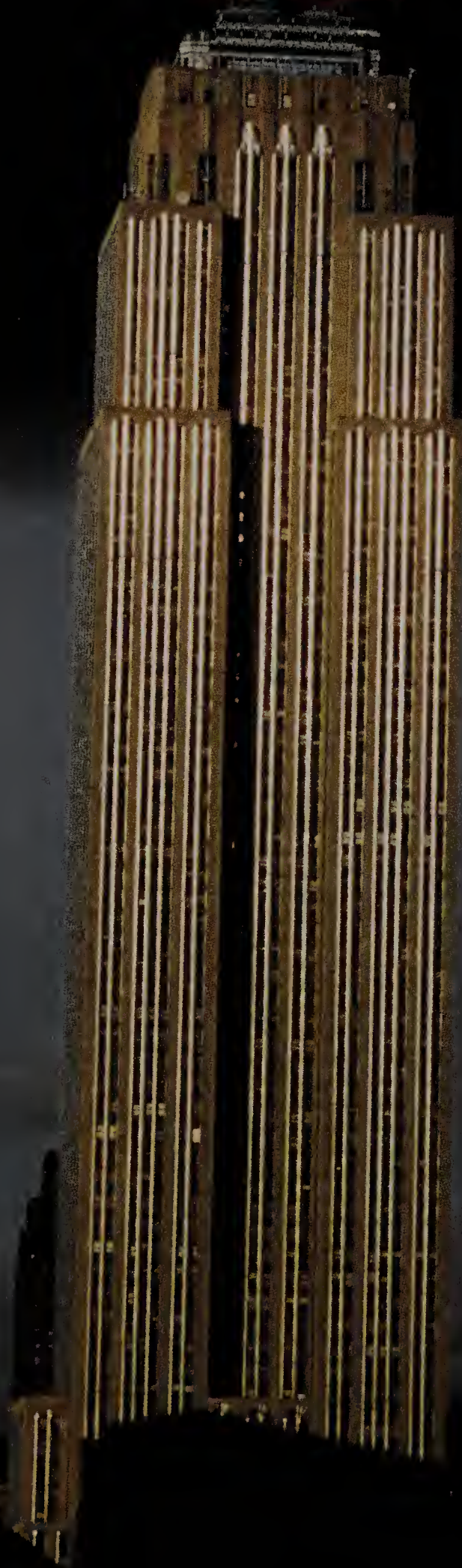
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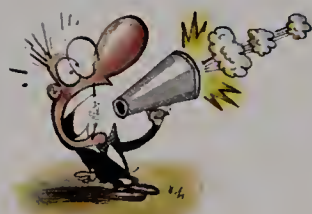
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Should IT Professionals Be in the Ethics Business?



SOUND OFF With direct access to sensitive data, IT workers are confronted daily with ethical decisions, but they have little in the way of ethics training. Should they hand over tough decisions to HR or learn how to handle them? Join the debate. comment.cio.com

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MENTOR-MATCHING SERVICE CIO's new service connects mentors with IS managers looking for leadership counsel. Veterans, share your hard-earned insight with next-generation CIOs and give something back to your profession. You'll be a better manager for it. Contact Senior Executive Editor Richard Pastore at pastore@cio.com.

The Seamy Side of IT

CIO RADIO Steve Baldwin and Bill Lessard, coauthors of *Net Slaves: True Tales of Working the Web* (McGraw-Hill, 1999), debunk the rags to riches myth of the high-tech industry. (Coming June 7.) www.cio.com/radio

Featured This Month

WHAT IS A B-WEB? Chances are, you're already a part of one, so you'd better brush up on the rules. From June 1 to June 30, CIO's Reading Room will feature an Ask the Author appearance by Don Tapscott, David Ticoll and Alex Lowy, authors of *Digital Capital: Harnessing the Power of Business Webs* (Harvard Business School Press, 2000). Read an excerpt from the book and pose questions to the authors. www.cio.com/books

"It's not easy turning in your boss or coworkers, but it saves the company headaches down the road."

—A reader responding to Sound Off, "What Should You Do with Illicit Information You Find on the Job?"
comment.cio.com

The Check's in the E-mail

ASK THE EXPERT Have a question about electronic bill presentment and payment? From June 1 to June 15, Darryl Dobin, executive vice president and chief marketing officer for San Francisco-based Just in Time Solutions, will offer insight into the internet billing standards debate and advice on choosing an online billing solution.
www.cio.com/CIO/expert

You've Got Two Weeks

ENTERPRISE VALUE AWARDS The deadline for applications, which you can find online, is June 15. If your IT department delivers lasting value to the enterprise, tell us about it. Winners will be profiled in the Feb. 1, 2000, issue of CIO and honored at an awards ceremony in Tucson, Ariz.
www.cio.com/eva

Tell Me Something I Don't Know

ANALYST CORNER The latest research on ASPs, IT performance and more. www.cio.com/analyst

Extra, Extra

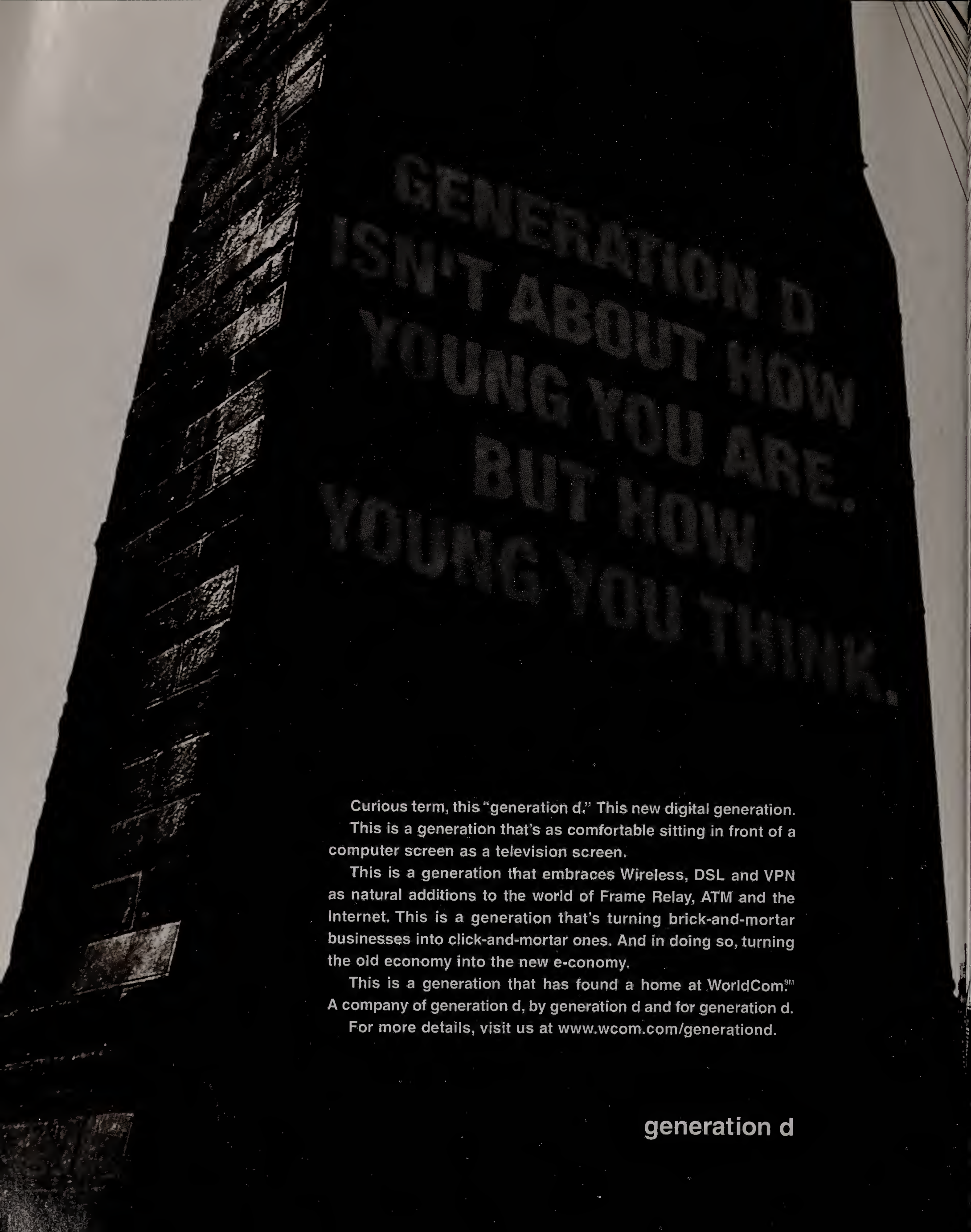
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From the Editor

lundberg@cio.com

In Sync

You never know where you're going to find inspiration.

Friday night was Lip Sync night at my kids' elementary school. This is an annual event put on by the fifth-graders and some of the more extroverted teachers and administrators. The kids spent the last two or three weeks choosing songs, learning the music, arranging dance moves, planning costumes and getting together with their fellow performers to rehearse. My daughter and two of her pals performed Randy Newman's "You've Got a Friend in Me," the theme song from *Toy Story*. My favorite performance was a rendition of "The Saga Begins," Weird Al Yankovic's reworking of *Star Wars: The Phantom Menace* set to the tune of Don McLean's "American Pie" (check it out at www.sagabegins.com). But the performance I'd been hearing the most about since rehearsals began was "Stayin' Alive," from the movie *Saturday Night Fever*. According to the kids, it was going to be awesome.

But something happened. On Thursday, the three boys doing "Stayin' Alive" (I'll call them Luke, Pete and Benny) were in the boy's room changing for the dress rehearsal. Pete and Benny ask Luke, by far the smallest of the three, where he got his costume. Luke tells them he borrowed it



from a friend—who happens to be a girl. Pete and Benny think this is a riot and start teasing Luke. The teasing escalates and things get rough; Luke doesn't stand a chance. Teachers find out, and Pete and Benny are banned from Lip Sync night. So not only do Luke's friends turn on him, but this thing he's been working toward for weeks is ruined.

Only it wasn't. "Staying Alive" is the last piece of the night. We know at this point that Pete and Benny are out, and assume it will be cancelled. But no, the song's announced, and on comes Luke—all by himself. The music starts, the spotlight hits him, and I'll tell you, you've never seen a more enthusiastic, committed disco dancer. The kid puts his heart and soul into this five minutes like nothing else matters in the world. The rest of the kids go wild, yelling, "Go Luke!" in unison at well-placed breaks in the music. I am moved by Luke's courage and determination and also by the support shown him by the rest of the kids.

I don't know what Luke will take away from this experience, but I know I'll think of him the next time something discouraging gets in my way. Sometimes inspiration comes from unusual places.

Allie Lundberg

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Reader Feedback

FURNITURE.COM'S GUARANTEE

In the Jan. 15, 2000, issue of *CIO*, the "Furniture.com" case file and the accompanying analysis criticized the company's policy of allowing consumers only exchanges or store credit for returned items.

While that was the policy at the time the article was written, Furniture.com in January instituted a significant change in its return policy—a 30-day, no questions asked, money-back, customer satisfaction guarantee. Under the new policy, customers can live with a purchase for a month and decide if it's right. If a shopper is unhappy for any reason, design consultants will assist with a new selection—or arrange a full refund and return of the item, with no restocking, handling or return shipping charges.

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Don Goncalves • Director of Public and Investor Relations • Furniture.com
• Framingham, Mass. • dgoncalves@furniture.com



THREE CHEERS FOR CLEAR THINKING

Thanks for seeing through the smoke of battle and calling things like they really are. Two commentaries stood out in the March 1, 2000, issue. Combined with "E-Nuf Already," your editor's letter "Pushing the E-Panic Button" was among the first clearly stated, clearly considered comments on the state of IS-IT and business planning-management I've seen since the world began to lose its mind with

internet mania. The balance you speak of, "nimble strategies" versus "panic instead of strategy," is precisely what's called for.

While lumbering strategies that center on denial of the changes that surround us will clearly be self-exterminating,

so too will be those reactions to the current level of change that assume that visioning, planning and managing are things of the past.

Thanks for reminding those of us who believe as you do that we're not quite as alone as we sometimes think.

Justin T. Donie
Cincinnati

E-LEARNING UNBOUND

"Learning Unbound" [*CIO*, March 15, 2000] presented many innovative approaches to corporate training and made the important point that learning occurs through employee-initiated

programs, seminars and informal interactions.

However, I felt the article was missing a presentation of e-learning innovations, for example, utilizing the internet for courses, training, seminars and informal communication. There is a wide range of technologies, varying in sophistication and capabilities, that are used successfully within many corporations.

In my experience, I've seen that not only can effective learning and training occur, but there are side benefits, such as the creation of virtual communities and the development of greater technology literacy, resulting from introduction to and use of technology.

Lisa Neal
Senior Research Engineer
EDS Web Universities and Training
Lexington, Mass.
lisa.neal@eds.com

EDS IS A-OK

In reflecting upon the March 15, 2000, article "Insurer, Heal Thyself," I find myself less than pleased with the characterizations of Blue Cross and Blue Shield of Massachusetts (BCBSMA). Since I was interviewed for this article, I bear some responsibility for its tone.

BCBSMA is made up of individuals who are singularly focused on making it one of the best companies in America. The people who work here are all dedicated to providing our health-care members and the health-care professionals who care for them with the highest-quality service. In the technology division for which I have responsibility, the associates bring a unified determination to their job every day.

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Mark Caron
Senior Vice President and CIO
Corporate Information Systems
Blue Cross and Blue Shield
of Massachusetts
Boston
mark.caron@bcbsma.com

hope that at some date in the near future, the platform running the machine will become completely transparent to the network architecture, turning the modern-day PC into something better described as a network interface device.

This would also, as your article suggested, make the machine itself of much less importance to anyone other than the end user. No longer will we need to configure and run Samba, AppleTalk, NFS or the full gamut of other programs needed to make a companywide network efficient. This is not to say that the user interfaces need to become iden-

robotic dinosaurs...well, copulating.

The thought "now we've gone too far" whizzed through my head. And of course, I read the well-written and informative article front to back. No robotic dinos copulating (they are standing side by side if you look real close). So I have to wonder if this subliminal suggestion was intentional?

April Fools, perhaps?

I guess it's comforting to realize that sex, even clickity clackity old robotic dino sex, still sells, huh?

Gordon Peterson
Technical Account Manager
IDX Corp.
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It becomes increasingly complex to provide companywide networking services to each user as new operating systems and versions of that operating system are placed on our LAN.

A COMMON GOAL

I agree with the publisher's opinion expressed in "A New Mandate" in the April 1, 2000, issue. I am the CIO of a small company in Virginia that focuses on database-driven internet development. We have tried to accommodate the preferences of new employees when equipping their offices because we believe it will increase productivity and job satisfaction. It was difficult enough to deal with the Windows-Macintosh debate; now we have Linux joining the fray as well. Each of these has its own merits, but it becomes increasingly complex to provide companywide networking services to each user as new operating systems and versions of that operating system are placed on our LAN.

Driven by this problem of platform-dependent networking utilities, I believe that the various types of PC are going to be forced toward a uniform point. I

tical, but beyond the network card, device A should not appear any different from device B.

I'd love to see an article on how we can reach that goal in an industry still focused on developing proprietary products.

Steve Higgins
Information Officer
NightLight Design
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Harrisonburg, Va.
steve@nldesign.com

NO FOOLING

I usually make a cursory pass through my new CIO each month and then make a mental note of the articles I want to read. But, when I hit page 46 of the April 1, 2000, issue, I stopped. Under a banner that read "Robots" and a headline "Of Purrs and Grrrs" is a picture of what appears to be two

We're impressed with your active imagination. However, we doubt the photographer shot the photo with a sexual connotation in mind. And knowing how costly these robots are to build, natural reproduction is probably preferred.
—The Design Staff

When I saw your article on the new Techno Bra ["Cross Your Heart," Trendlines, CIO, April 1, 2000], I couldn't help but think of George Plimpton's farce in the April 1 *Sports Illustrated* of years ago in which we learned of Sidd Finch, the phenom pitcher whose fastball exceeded 120 mph.

Real or fictional, the product information was good for a laugh.

Gary Abram
Executive Vice President-Development
Eagle Global Logistics
Houston
gabram@eagleusa.com

WHAT DO YOU THINK?

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Edited by Katherine Noyes

H I G H - T E C H M A T C H M A K I N G

The Data Game

IT'S AN OLD STORY, sort of. Boy meets girl. Boy realizes he and girl are completely incompatible. Boy has to find new girl.

"People waste a lot of time with people with whom they have nothing in common," says Ed White, an entrepreneur who imagines instead an uber-efficient dating world where potential couples use his infrared smart cards to determine their compatibility—without the small talk. After all, if that hottie at the bar

doesn't appreciate museums, cigarettes and punctuality, why bother? "You look at this very attractive guy, you like what you see," White says, "but if the score is lousy, you say, 'Next!'"

Ratings are based on each individual's answers to a quiz from a marriage compatibility course. The 96 questions—in categories such as habits, beliefs and sex—are organized into pairs, with the first question asking for an opinion and the second determining that opinion's importance. The more answers two people have in common, and the more weighty those answers, the higher their compatibility score. The average score

Continued on Page 32



G O L F A D V I C E

Keeping the Faux Pas Below Par

WONDERING WHY nobody called you back after that recent "get-to-know-you" golf outing? Maybe it was something you said or did—or *didn't* say or do.

Now that golf courses have become a prime setting for cutting business and career deals, more CIOs are paying attention to their fairway etiquette—or lack thereof. For the manners-challenged, Mr. Golf Etiquette (www.mrgolf.com) has the answers.

The website, which averages 40,000 to 50,000 visitors a month, was founded by Jim Corbett, vice president of business development for VersusLaw, a law research company located in Redmond, Wash. Corbett has discussed more than a few business matters on the nonhyperlinks, but worries that many duffers are blowing potential opportunities. "Not everyone can be a great golfer in that they will hit a score

Continued on Page 32



"WHY ARE I.S. ORGANIZATIONS BEING FORCED TO HIRE 13-YEAR-OLD PROGRAMMERS? BECAUSE ALL OF THE GOOD 12-YEAR-OLDS ARE TAKEN!"

—Frank Gens, senior vice president of internet research for IDC, speaking at IDC's recent Directions conference in Boston

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The Data Game

Continued from Page 30

is 75—just like in college—and it's up to individuals to decide who makes the grade.

Those who invest in the \$29.99 MatchUp system, offered by Interactive Digital Corp. (www.matchupsingles.com), can take the test on their PCs, download the results to the one-ounce, credit-card-size smart card and then point

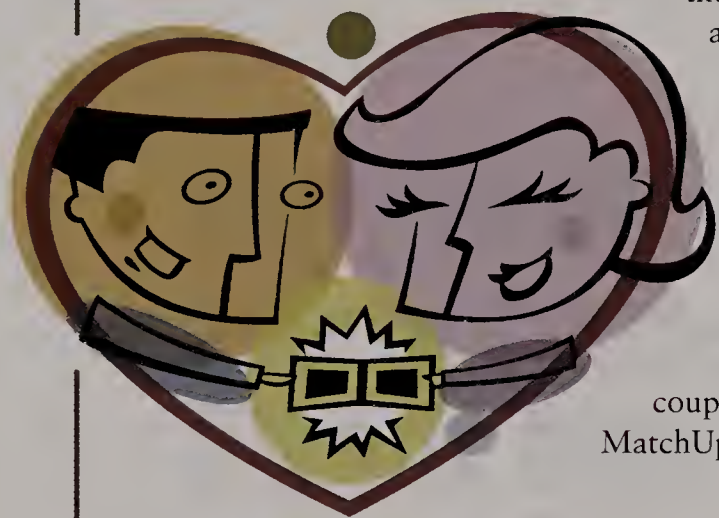
their card at someone else's. When they are within about a foot of each other, the infrared cards can exchange data and then display the compatibility rating on the screens of both cards.

"My dream is very simple," says White, himself happily married.

"I'd like every single person in the world to have one of these."

Of course, if things go well, every couple in the world may have a pair of MatchUp cards taking up space in the closet.

—Sarah D. Scalet



Stay Below Par

Continued from Page 30

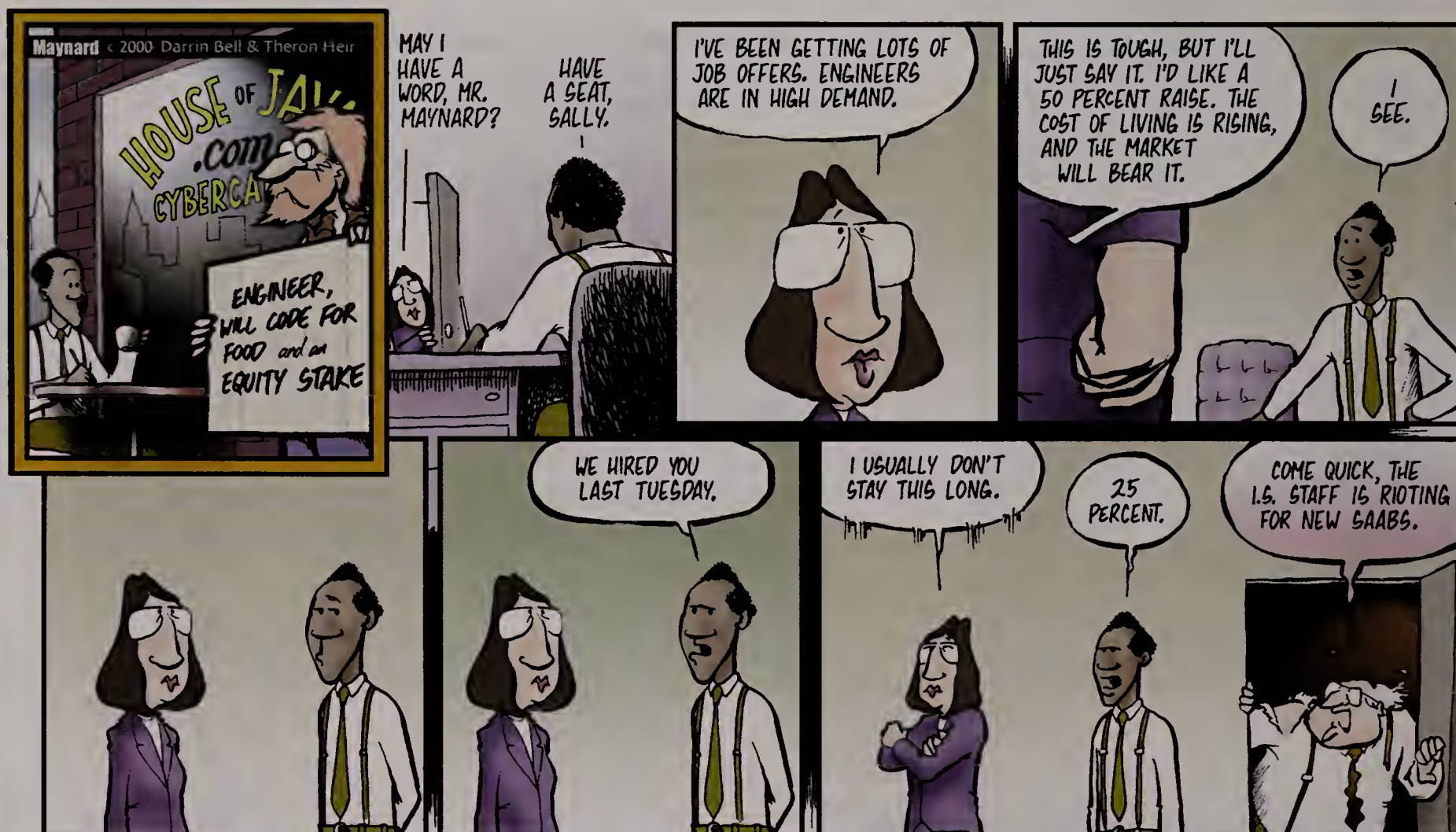
below par. But everyone can be a great golfer in how they act on the course toward their fellow golfers, toward the course and toward the game itself," says Corbett.

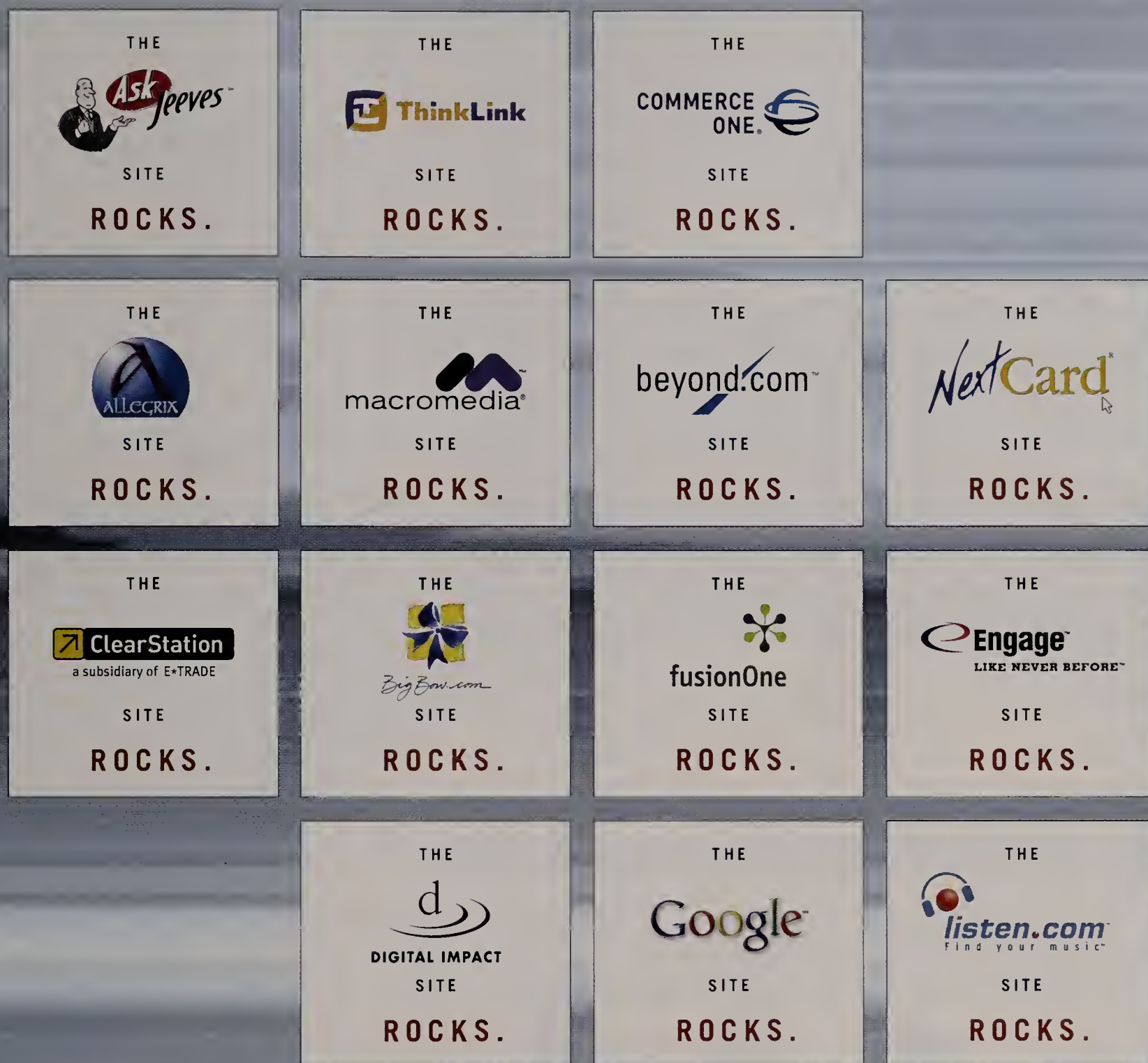
There is no charge to visit Mr. Golf Etiquette or to submit questions. Here are a few tips from the site:

- Be invisible (including your shadow) when someone is hitting.
- If the caddie does a good job, you should reward him with a decent tip.
- Walk, don't run.
- If you are driving a motorized cart, proceed at a moderate speed and keep your eyes open for other golfers.

—John Edwards

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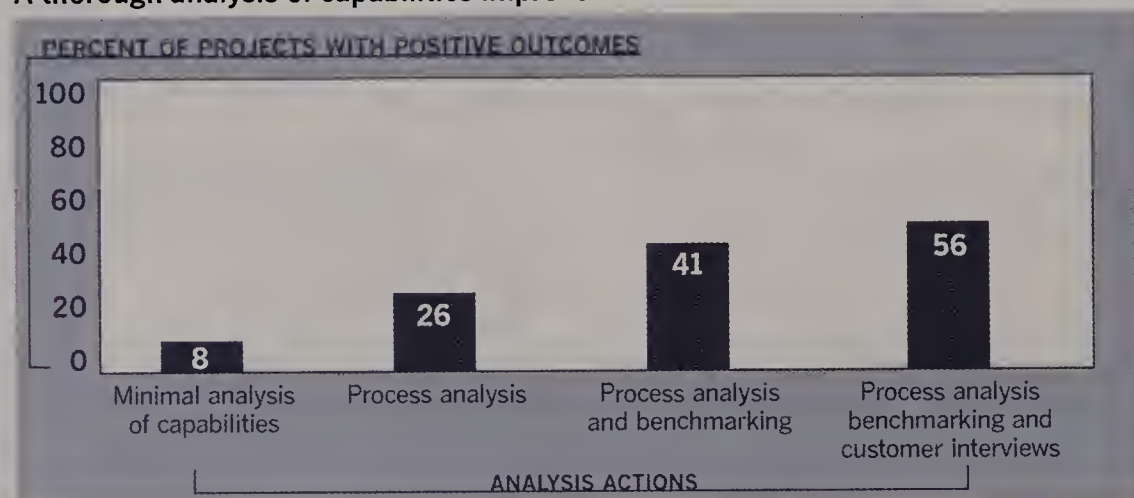
By the Numbers

Compiled by
Derek Slater

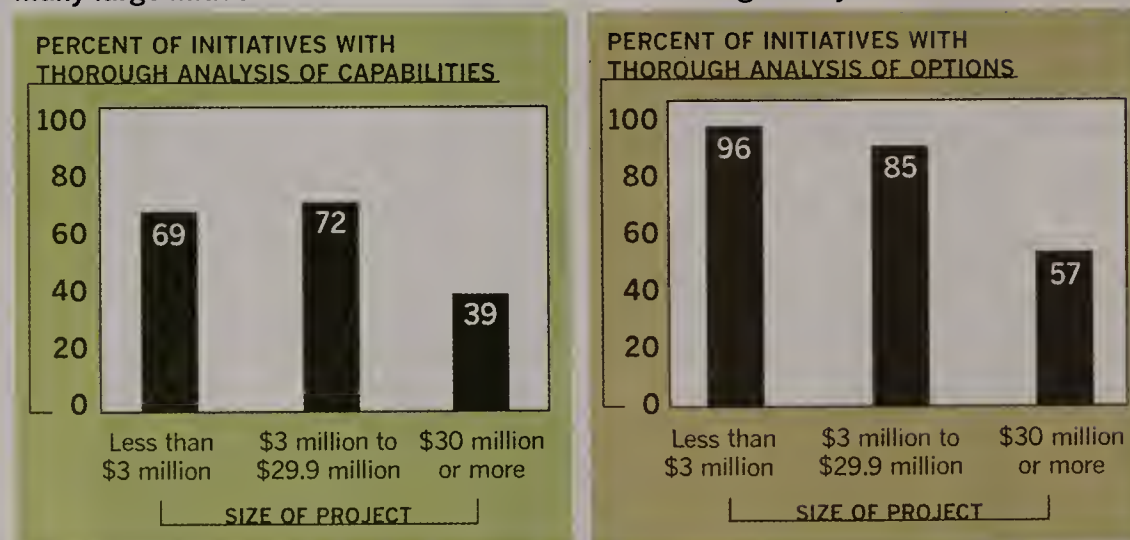
Enterprise Application Projects

ENTERPRISE APPS ARE THE RAGE. But truly successful implementations of enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM) and e-commerce systems are hard to come by. A Boston Consulting Group (BCG) survey found that only a third of project outcomes could be called "positive" or "strong positive." The survey determined that the odds of success rise as project planners perform a more thorough analysis of corporate processes and project options. Not too shocking—unless you consider the number of companies that don't do it.

A thorough analysis of capabilities improved outcomes.



Many large initiatives were undertaken without thorough analysis.



Best Practices for IT

1. Carefully analyze the problems and potential solutions. Sometimes a software implementation is not the only answer, or even the correct answer, for improving corporate performance, according to the report. In many cases, simple upgrades to existing software are more effective than new systems implementations.

One participant company was under the gun to increase inventory turns, according to Hal Sirkin, a BCG senior vice president based in Chicago. Rather than buy a packaged SCM solution, however, the company found after careful analysis that it could achieve the goal by reworking a few critical work processes.

Pre-project analysis should include competitor and best practice benchmarks.

2. Scrutinize vendors and costs. A third of the respondents to the BCG survey said they believed their vendor encouraged unnecessary spending. One in five respondents who had implemented ERP or SCM solutions said they could have achieved the same business value for much less cost.

3. Divide projects into manageable pieces. According to BCG's study, the average size of projects with a strong positive outcome was \$10 million, while the average for negative outcomes was \$90 million. Said one survey respondent, "Divide and conquer.... Do it piecemeal or none of it will be done right."

4. Know when to stop. Establishing clear metrics is one key to success. At the end of each step, "IS personnel have to work with business managers to figure out whether the next phase will add sufficient value," according to the report. Twenty-three percent of respondents identified "lack of a well-defined endpoint" as a contributor to overspending.

SOURCE: A BOSTON CONSULTING GROUP SURVEY OF MORE THAN 100 EXECUTIVES. FOR MORE INFORMATION, VISIT WWW.BCG.COM.

Suggest future topics to numbers@cio.com.



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EXPERTS ONLINE

Who Ya Gonna Call?

YOU'RE IN THE MIDDLE of cooking a crème brûlée for the first time, and it's just not coming out right. No problem: Log on to Keen.com and get immediate advice from a baking aficionado who can speak with you live before your guests arrive.

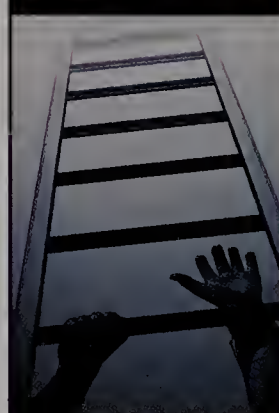
Visitors to www.keen.com can search under a wealth of categories—home, health and fitness, computers, hobbies, personal advice, parenting and so on—to see if an expert is available to talk. For a fee set by the expert (an average of 80 cents per minute, but ranging up to \$10 per minute or higher), you can click on an icon and Keen.com first calls you, and then conferences in the crème brûlée chef. To protect privacy, Keen.com does not release phone numbers, nor does it sit in on the call after connecting the parties.



The site also allows the experts (both professionals and amateurs looking to make a quick buck) to prerecord advice or send information by e-mail—for a fee. But the live calls are by far the most popular, says Karl Jacob, CEO for the San Francisco-based company, who thought up the idea while working for venture capital company Benchmark Capital. The site has users from Israel and Europe, and it offers a translation service that supports 10 foreign languages, Jacob says. At any given time, there are some 15,000 experts available to take your call, and one expert made \$1,500 in February. This is good news for Keen.com, since it takes a 30 percent cut of every call.

Drawbacks: You can't be sure of the expert's qualifications unless the self-proclaimed lawyer or doctor has sent her credentials to Keen.com (not required); those are then verified by a third party called Backgrounds Online. And the searching is a little clunky: The phrases "negotiating job benefits" and "buying a dog," for example, came up with nothing. Entering "Indian cuisine" brought up one individual named Rose whose bio reads: "I love Indian food but don't know how to make it." My thoughts, exactly! —Polly Schneider

HOT TOPIC



CAREER

The Firing Line

By Mindy Blodgett

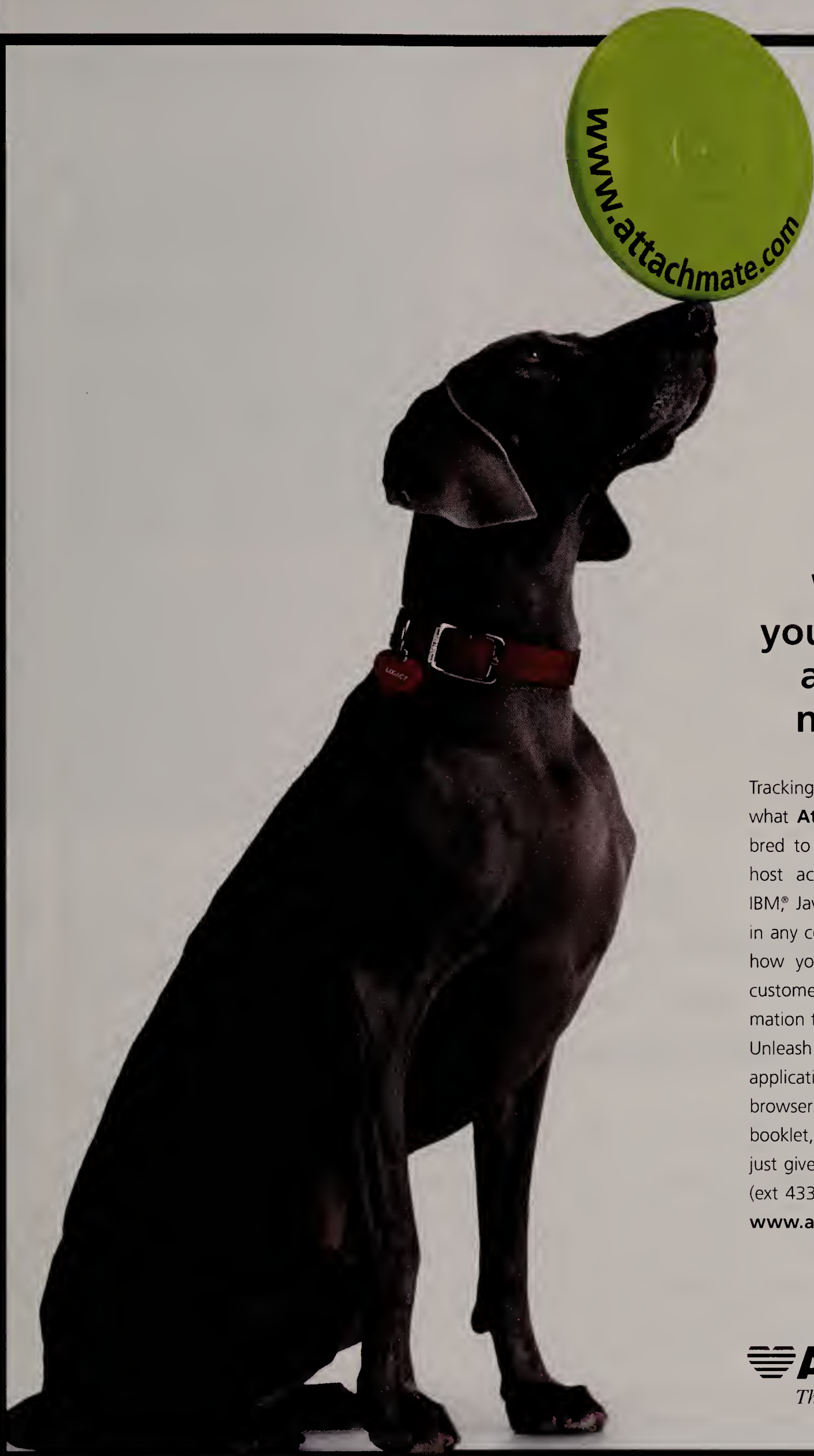
It may be true that the economy is booming and qualified labor is in short supply, but that doesn't mean managers aren't still occasionally faced with the grim task of firing employees. It's never easy, but now there's help: The Employment Roundtable, a New York City-based nonprofit consortium of business, government and think tank leaders, recently released "Letting People Go with Dignity," a report on handling employment terminations.

Today's hot labor market makes it more imperative than ever that terminations be handled in a sensitive manner, says Richard Bayer, cochair of the Employment Roundtable and COO of The Five O'Clock Club, a New York City career counseling organization that started the roundtable in December 1998. "You need to be able to recruit and retain good people, and your ability to do that is facilitated by your reputation in the marketplace," he says. When disgruntled ex-employees complain about unfair treatment, that reputation can suffer. "You also have to be concerned with the morale of the remaining workforce," Bayer adds.

The roundtable offers a number of tips for the manager doing the firing, including the following:

- Explain to the employee what went wrong. That information can make it easier for him or her to move on and leave the job behind.
- Make sure to explain how the employee's departure will be publicized.
- Let the employee return to his or her desk and share reactions with friends on staff. This allows him or her to gather some dignity and normalcy and to feel empowered, not railroaded.

For more information, visit www.5occ.com/roundtable.



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FRAUD INVESTIGATOR

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IN THIS WORLD of virtual communications and interaction, how do you ever really know who you're talking to? You don't, and therein lies a world of opportunity for con artists, scammers, grifters and deadbeats. Indeed, identity fraud is the crime of the new millennium, says Ross Silverman, chairman of the antifraud counseling litigation department of Katten Muchin Zavis in Chicago.

One tool that can help uncover the crooks is InfoGlide Corp.'s Fraud Investigator software, which peers behind seemingly innocuous data to detect suspicious patterns that may indicate a person is posing under several dif-

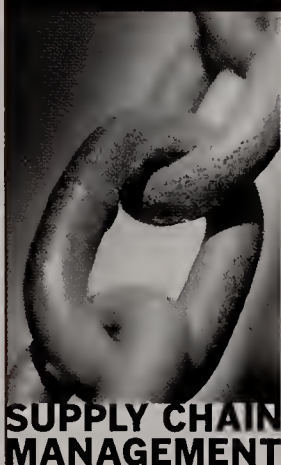
ferent names or making up Social Security numbers, says Jay Valentine, CEO of the Austin, Texas-based company. "It identifies instances of fraud that escape traditional exact-match searches."

The XML Similarity Engine that powers Fraud Investigator discovers links between different data files and databases by making sure that slight variations in names, addresses, phone numbers or other identifying data won't be excluded from a search's end results. The engine then converts the data into a hierarchical format and compares it to likely matches, ranking it with user-defined attributes.



Fraud Investigator costs between \$5,000 and \$35,000 per month, depending on exact capabilities and usage. For more information, visit www.infoglide.com.
—John Edwards

HOT TOPIC



SUPPLY CHAIN MANAGEMENT

In-House or Outsourced? *By Derek Slater*

One: Most everybody knows that supply chains are ripe for transformation and are a critical strategic area for the internet economy.

Two: Many companies nevertheless don't know what their supply chain management strategy is, or even how well their operations perform.

Those are the common conclusions of two recent surveys of senior executives regarding supply chain management. One survey of 80 Fortune 500 executives—"Moving the Supply Chain into the Digital Age: Integrating Demand and Supply"—comes from London's Economist Intelligence Unit (EIU), which is a member of global communications company Economist Group, and Meritus Consulting in New York City. The second poll—"The Millennium Manufacturing Supply Chain Survey"—is from Reston, Va.-based consultancy Compass America, with a response base of 258 senior supply chain executives in North America, Europe and Australia.

In the EIU survey, 82 percent of the respondents said they believe the internet will have a major impact—or even com-

pletely transform—supply chain performance over the next three years. Yet nearly a third of them were unable to estimate the supply chain performance of their own organizations. Similarly, 70 percent of the Compass respondents indicated that a supply chain strategy is necessary for achieving competitive advantage. However, nearly 60 percent said their own strategy is either nonexistent or lacking detail, and 50 percent described "limited formal means of measuring supply chain performance." The upshot, according to Andrew Johnson, head of Compass's practice for manufacturing, is that executives have trouble understanding what effect their strategy decisions truly have on supply chain performance.

What's even more interesting, of course, is how companies plan to solve that problem. Compass says many respondents are looking to IT for the solution; 60 percent anticipate rising technology expenditures to address SCM. That number matches up interestingly with the EIU finding that 40 percent of its respondents plan to outsource their distribution and transportation functions within the next three years.

For the EIU survey, visit www.eiu.com. More information on the Compass study can be found at www.compassamerica.com.

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Rosita Smith and Hans Gant are working to spread the good word about Atlanta.

R E C R U I T I N G

Move Over, Silicon Valley

HIGH-TECH COMPANIES are flourishing, venture capital is flowing and spacious loft apartments are affordable and plentiful.

Sound like Shangri-la?

It's the latest pitch for Atlanta, where the local chamber of commerce has hired a full-time recruiter specifically to attract young technology workers with promises of jobs, a low cost of living, exciting night-life and sports events galore. "People think of Atlanta as a small, sleepy Southern town," says Rosita Smith, the new director of talent development for the Metro Atlanta Chamber of Commerce. "We want people to know that it's a vibrant and diverse community and a cultural place."

The Atlanta area ranks 10th in the nation in high-tech jobs, according to Hans Gant, senior vice president of economic development for the Atlanta chamber. But as in other technology-friendly cities, the workforce isn't meeting the demand. Under pressure from Atlanta's roughly 10,000 technology companies—led by AT&T, BellSouth and Lockheed

Martin—the chamber launched a \$4 million nationwide advertising and recruiting blitz last year to attract startups and fill the widening gap between technology jobs and workers. Just before hiring Smith in February, the chamber launched a slick new website complete with job listings and photos of loft interiors.

Smith, the former associate director of career services at the Georgia Institute of Technology, has been charged with spreading the good word about Atlanta by traveling to college campuses and recruiting fairs across the country. She also plans to bring local academics and industry leaders together to help find ways of better preparing students for the job market.

It's too early in the five-year effort to judge results, Smith and Gant say. But traffic on www.atlantasmartcity.com rose 20 percent in its second month after receiving 200,000 hits in February. And other communities are taking note of the initiative and seeking advice from the Atlanta chamber. "So far, we've been pleasantly surprised," Smith says. "People are noticing us" —Susannah Patton

R O L E M O D E L S

Whom Do You Admire?

BILL GATES may have his share of legal problems, but he's also got some loyal fans in the IT community. In a recent survey by RHI Consulting (www.rhic.com) in Menlo Park, Calif., 1,400 CIOs were asked who in the technology field they admire most, and Billy the Kid topped the list:

37% Bill Gates

(chairman and chief software architect for Microsoft)

19% Michael Dell

(chairman and CEO for Dell)

9% Steve Jobs

(CEO of Apple Computer)

7% Linus Torvalds

(Linux inventor)

5% William Hewlett

(cofounder of Hewlett-Packard)

3% Scott McNealy

(chairman and CEO of Sun Microsystems)

3% Larry Ellison

(chairman and CEO for Oracle)

17% Other/Don't know

In this category, survey respondents named Marc Andreessen, cofounder of Netscape; John Chambers, president and CEO of Cisco Systems; Eric Schmidt, chairman and CEO of Novell and Andy Grove, chairman of Intel.

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Rubin Retires from Elf Atochem



Bob Rubin

WE CATCH Bob Rubin on his last day of work. It's Friday, March 31, and although his retirement isn't official until June, the 58-year-old senior vice president and CIO of Philadelphia-based Elf Atochem North America has decided to use his accumulated vacation time and just enjoy springtime in Pennsylvania. "I want to do things I haven't had time to do," Rubin says. "I want to sit

outside, do some gardening, just read a book."

Not a bad way to unwind from an IT career that spans nearly four decades. In all, Rubin has spent 35 years in IT—the last 15 of them at global chemical company Elf, which is a pretty remarkable ride for a CIO. In his time at Elf, Rubin has been a part of mergers and acquisitions; he oversaw a swift and successful SAP rollout; and he managed his IT shop so well that he developed a national reputation as an IT leader. Rubin even served as a *CIO* editorial advisor.

Short term, Rubin will be replaced by

Gerard Benetau, a senior business executive from Elf's French parent company, Elf Aquitaine. Benetau will serve as interim CIO for the rest of this calendar year, after which Rubin's lieutenant, David Seifert, currently vice president of strategic planning, will step up to be the permanent CIO.

Long term, Rubin hardly sees himself fading away in retirement. Once he's had a chance to unwind and recharge, he expects to pursue some ventures he's always been interested in but never had time for—namely, serving on corporate boards, doing some senior-level consulting as well as writing and teaching about IT management. "I think the skills I've learned and the scars I've earned over the years can be useful to people in each of those arenas," says Rubin. He also plans to be active in his wife Marilyn's home-based consultancy, Valley Management Consulting.

But before he gets back down to business, Rubin has some plans for his first week without work. "We're going to sleep a little later than normal, then go out for a very nice lunch—I've already got some restaurants in mind," Rubin says. "And then we'll just do whatever comes to mind."



Player's Guide

Ray E. Greer → **Springs Industries**

Formerly vice president and CIO at Philips Electronics China Group, Greer has been appointed senior vice president and CIO at Springs Industries, a Fort Mill, S.C.-based home furnishings manufacturer.

Charles W. Johnson → **Louisville, Ky., *The Courier-Journal***

A 20-year IT veteran, Johnson has been named the first-ever vice president of information technology at the Louisville, Ky., *The Courier-Journal* newspaper. Previously, Johnson was director of IS at The Courier & Press in Evansville, Ind.

Jeff von Gillern → **IronPlanet Inc.**

has been named CIO of IronPlanet, a Palo Alto, Calif.-based online brokerage for used heavy-construction equipment. Formerly senior vice president of processing services at Visa International, von Gillern is responsible for managing IronPlanet's customer service/inside sales center, IS and all web operations.

Paul B. Hutchison III → **FuelSpot.com**

has been appointed COO and CIO at FuelSpot.com in Lowell, Mass., an e-commerce portal for the energy products industry. In this role, Hutchison will oversee operations and customer service and will be responsible for developing and implementing FuelSpot.com's web infrastructure, desktop applications and integration with customers' back-office systems.

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I.T. EDUCATION

A Mold for the Next Generation

YOU KNOW the refrain by heart: We need qualified IS workers with business skills, and we need them now. Well cheer up: In a bid to

quiet rumblings from industry leaders, a group of IS academics has published a model graduate curriculum they believe will help turn out business-proficient IT professionals at an exponential rate.

The new curriculum for the MS degree in IS brings the previous model, published in 1982, into the internet age with courses ranging from data networking to IT policy and strategy. "When we went

out to talk to industry, the cry was relevance," says Paul Gray, professor at Claremont Graduate University's School of Information Science in Claremont, Calif., and cochair of the curriculum committee, made up of members of the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS).

The curriculum, published in January, is designed to tempt a diverse group of students. "If you attract only the normal techies, you don't add to the workforce," says John T. Gorgone, Rubin professor of computer information systems at Bentley College in Waltham, Mass., and cochair of the curriculum committee.

Students new to the field start out with a series of IT and business foundation courses such as IT hardware and software, and financial accounting. Core courses include data management, project and change management, and data communications and networking, as well as systems integration. To finish up, students take career electives that can be tailored to the regional needs of industry.

Some schools are already using the curriculum, although officials don't know exactly how many. And more could be signing on soon: While 50 U.S. schools advertised a master's in IS program three years ago, more than 100 now offer the degree. —Susannah Patton

TERABYTES TO THE MAX

My Database Can Beat Up Your Database

IF THE PRESS releases are any indication, there seems to be a heady competition among database vendors these days to see which can build the biggest, baddest database ever.

Take IBM, which announced this winter that in partnership with EMC and Oracle, it had built the world's largest single-system data warehouse—82 terabytes of deal-sealing proof that it could protect British Telecom on the customer playground. The system sounds pretty hefty. After all, it could hold enough information to fill three-drawer file cabinets lined up from Miami to Seattle.

But that's not so tough, say the folks at NCR, who lay claim to the world's largest data warehouse in operation. Wal-Mart's data warehouse (for the record, it uses parallel architecture rather than single-system) could hold a whopping 101 terabytes, enough to stuff those file cabinets from Miami to Juneau, Alaska. And Wal-Mart is just one of 166 customers with systems exceeding a terabyte, a spokesperson says. "NCR is the only company with more than 100 data warehouses of 1 terabyte or greater on a single platform."



Jabs back IBM: "IBM now counts 187 customers with more than a terabyte of data, eclipsing NCR's."

Of course, as everyone knows, size isn't everything. The volume of data actually stored is more significant, says Richard Winter of Waltham, Mass.-based Winter Corp. Toward that end, Winter Corp. will announce this month new winners of a contest for the world's largest database. Visit www.wintercorp.com.

—Sarah D. Scalet



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Career Counsel

Mark Polansky Offers Advice to Aspiring CIOs and IT Managers

Steppin' Out

Q: I am looking to re-enter IT at a director level. I have 10 years' experience in information technology managing large-scale mainframe and client/server projects. For the past three years I have been a director in a corporate strategy group focusing on long-term strategy. To date, many of the discussions I've had have ended with a concern over my lack of hot new skills. Am I going to have to take one step back before I can take two steps forward?

A: Your first choice should, of course, be a step sideways and then two steps forward. I have to believe that there are companies out there that can use your mainframe and client/server project experience today, while you look for internal opportunities to add "the new stuff" to your portfolio. Maybe it's the director title that is throwing you off track.

I don't think that you will wind up in the top or No. 2 IT seat after your strategy sidebar, unless the move is made within your current company. Then again, is the lack of new skills being used as an easy exit for interviewers who see some other deal breaker and can't or won't say so? Get some honest and



objective third-party advice on your interview presentation package.

FEELING THE BURNOUT

Q: I'm the director of IT at a midsize manufacturing company. Among other successful projects, I led a major enterprise resource planning software implementation. The stress and burnout has caught up to me, and I would now like to move into an educational position. How can I make the move from an information technology professional-management position to an information technology teaching position at either the college or high school level?

A: Before you steer your career into the world of education, be careful. Make sure you aren't overreacting to the stress and strain of your ERP project. The world of education can be an

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extremely rewarding one despite its lower pay scale and lack of equity possibilities. But it is culturally and environmentally very different from what you have been accustomed to.

If you are indeed ready, check out the position announcements in higher education, both in teaching and practicing IT, at www.educause.edu, the website of Educause, an international nonprofit association whose mission is to help shape and enable transformational change in higher education through information resources and technologies. And check out www.chronicle.com—the website of *The Chronicle of Higher Education*, which lists some primary education openings as well as college-level opportunities. Also, give serious

The transition from Big Five consulting to corporate information technology is an issue of operating management experience.

consideration to the broader universe of nonprofit associations, organizations and foundations. These employers offer similar environmental factors and rewarding missions as does the field of education.

TRANSITION GAME

Q: I am a management consultant in a Big Five firm. Can you tell me what additional background experience or skills companies seek when they recruit new executives? And does the school at which one receives an MBA make that much difference as long as it is ranked within the top 20?

A: The transition from Big Five consulting to corporate information technology is an issue of operating management experience. While your time in a Big Five firm has undoubtedly sharpened your analytical, project management, communication and interpersonal skills, you have not yet had a chance to head up and manage a piece of a business-aligned IT function, with long-term political considerations and performance measurement criteria.

This is, happily, a change readily accepted by most but not all companies with the assumption that Big Five people are smart and savvy individuals who can make the transition successfully. And an MBA from any top 20 university is fine, but there is a bit of difference between the top 10 and the next 10. Within those ranges, choose the school that has the best reputation for your area of interest. For example, look at Wharton for corporate finance, check out Northwestern for marketing and Harvard for entrepreneurial management.

PASSED OVER

Q: I was recently interviewed for a CIO position within my company and was considered one of the top candidates. However, the position was awarded to another candidate. I would like to pursue other CIO positions discreetly, either through search firms or advertised positions. My background is primarily IT (15 years), with the last four years focused on e-commerce. I have both a bachelor's in computer science and an MBS degree. What would be the best way to start the search?

A: The first step, of course, is to craft a great résumé. Make sure to emphasize your relevant experiences and accomplishments and get some trusted senior executives, both IT and non-IT, to review it.

Second, keep your eye on the important public sources of position announcements and advertisements—but remember that only a fraction of CIO openings are advertised.

Third, make contact with a select group of search consultants who are well known for their work recruiting chief information officers. There are many directories of executive recruiters, for example, the one available from Kennedy Information (www.kennedyinfo.com) is particularly helpful because it is indexed by industry and functional specialty as well as by geography. You will find it in the reference section of most good public libraries, or purchase a copy—it's expensive but indispensable to an organized search.

NEED A PHD?

Q: I have been in the health-care industry for five years as a director of complex IT shops, and I have an MBA. What are your thoughts on the advantages of a PhD in information systems? Is it a plus or minus—or is it overkill?

A: You are in an industry where many PhDs are routinely working in drug discovery, the research and development function, medical and regulatory affairs, and so on. Perhaps a PhD in information systems would help you gain some missing respect from your user communities, and perhaps it would make you feel better about yourself. If so, then go ahead with your plan, find an appropriate school and just do it; but I doubt that a PhD is necessary for you to do a great job as an IT director. In fact, a PhD in most commercial and industrial venues would by generalization flag you, perhaps unjustly, as an academically oriented individual, one not able to run a fast-paced, high-pressure IT shop. PhDs are usually seen on university campuses and research and development companies that build hardware and software, developing new and emerging technologies.

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Career Counsel

HOLDING PATTERN

Q: I am an IT engineering manager with 20 years' IT experience and five years' IT technical management experience. My long-range goal is to be a CTO for a small or midsize high-tech company. I'm considering a job change into a senior IT architect position for a large company (20,000 employees). I would not be managing others in this position. Will the lapse in management hurt my chances of getting a CTO position? Would continuous years of IT management fare better?

A: Since you have already managed people, projects and budgets for quite a few years, I recommend going forward with the senior IT architect position. First, functioning in a staff role (it's really very different from line management) will give you the time and experience to really hone your collaborative

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relationship building and other interpersonal and communication skills since these capabilities are often very visible in a staff position.

Second, the experience of focusing on technological issues, including the application and leveraging of new and emerging technologies, is a critical success factor for your ultimate objective of becoming a chief technology officer. I believe you will be fine as long as you don't get sidetracked out of management for too long.

EXECUTIVE COACHING

Q: I am director of the information systems division, reporting directly to the CEO, for a small company (less than \$20 million in revenues) focused on the aerospace community. This is my first executive-level job, and I am currently seeking executive coaching to help me with my career. I have met some opposition in the company about getting this kind of assistance. Does that mean that they expect me to fail? I have almost 20 years' experience in management with 17 years of IT background. Was I out of line to ask for assistance?

A: No, I am quite certain that they don't expect you to fail. It is simply a matter of resources. Unfortunately, smaller companies (and generally privately held companies as well) have less room in the budget for niceties like management training. They

also don't have the greater perspective of the need to professionally develop their human resources that larger organizations do. It's just one of the many trade-offs of big company versus small company decisions that many of us have faced in our careers.

CIO VIRTUOSO

Q: I am a 22-year-old IT director for a small but rapidly growing business. I created the information technology department and earned my position by strategically planning and applying technology to our business operations. I've developed our database, website, network and data management. I continue to integrate new technology with our business models by successfully hiring, training and managing new employees in the IT profession to deploy our strategy. The pay has been very low compared with other chief information officers, vice presidents and directors.

Should my age or lack of several years of experience hold me back from trying to earn a vice president or CIO title and salary? I am a major part of the success of the company, but how do I convince the president that I am vice president or CIO material?

A: Wow, you have many accomplishments and yet are only 22 years old. I'm impressed, but it sounds like the president isn't—yet—or at least he's not showing it. Unfortunately, your age and years of chronological experience have a negative impact on your compensation since the lack of time and job changes (internal or external) have limited the number and probably the size of the raises you have received beyond your entry-level salary.

A dramatic adjustment may very well be in order to bring your earnings up to reflect your position and level of responsibility, and especially your contributions to the enterprise, not to mention parity with the market. Sit down with your president (get him out to lunch or dinner if possible) and in a firm but positive way, ask him if he is aware of your achievements. Educate him regarding the role of chief information officers and what a good CIO earns in today's economy. Have a number in mind in case he asks. And be prepared to initiate a job search if he doesn't. **CIO**

Mark Polansky is a managing director and member of the advanced technology practice in the New York City office of Korn/Ferry International. He has also been recently named the chairman of the Greater New York Chapter of the Society for Information Management. The web-based Executive Career Counselor column (found on www.cio.com) is edited by Web Research Editor Kathleen Kotwica. She can be reached at kkotwica@cio.com.



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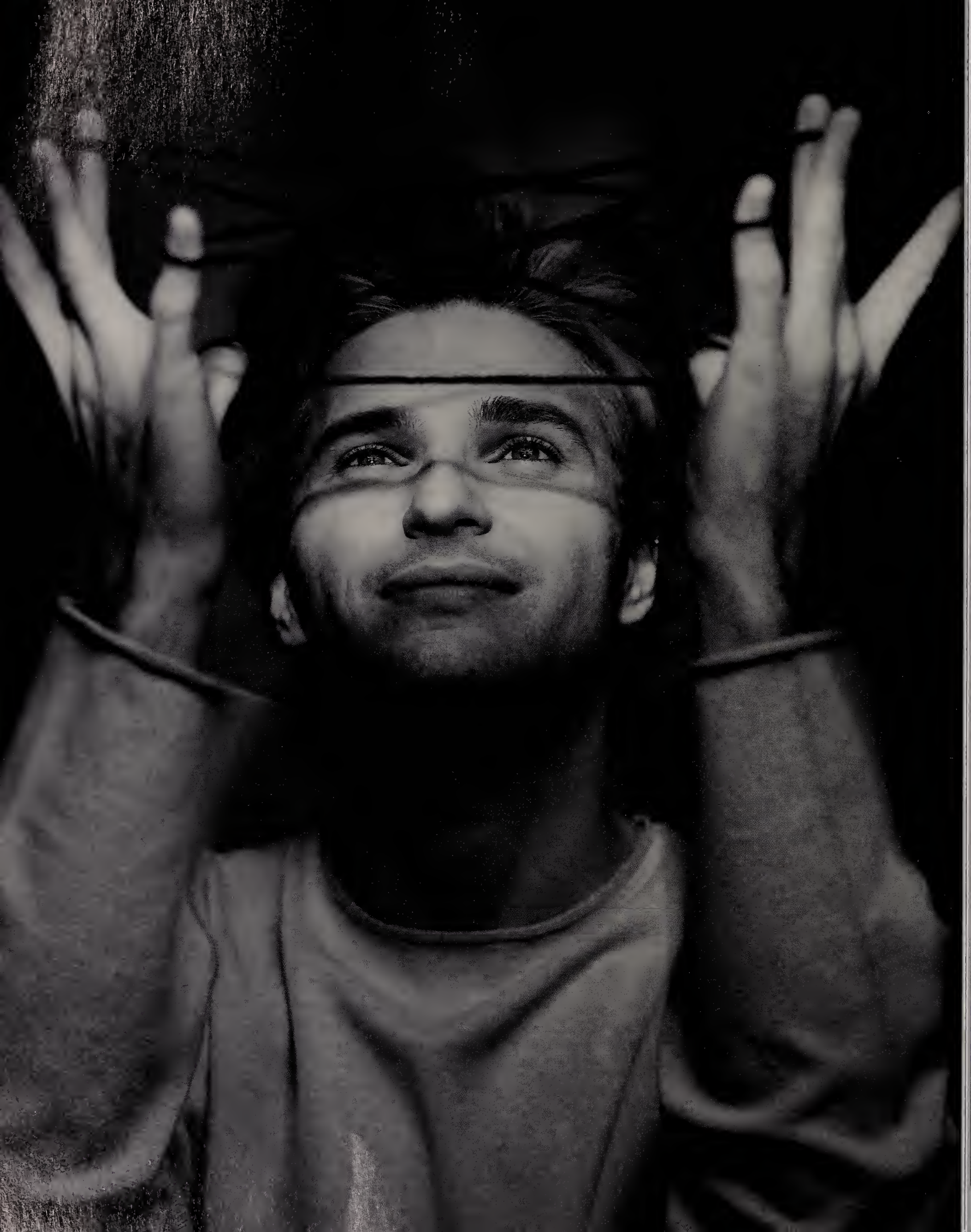
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Davenport On...

The Winner's Circle

If you want your e-strategy to succeed, you'd better figure out what you want to be

BY TOM DAVENPORT

CLEARLY, ONE of the diseases of the Internet Age is hubris. Symptoms involve "Cashing out quick before the investors understand what's going on here."

A subtler and more interesting symptom of internet hubris is the "we can have our cake and eat it too" business model. With it, the thinking goes, the internet is such a powerful tool that companies can ignore time-honored business choices and have it all. Low cost or good service? Consumer markets or business-to-business? Companies have always had to make such distinctions based on good business sense, and strategy textbooks have rationalized such decisions since Michael Porter was in diapers. Sure, a company can have different business models under one corporate roof, but conventional wisdom dictates that they be segregated across different business units.

Now a lot of organizations are feeling constrained by such thinking; they want to simultaneously adopt both alternatives within one business unit. Strategic focus no longer matters in many internet business models; all that matters is being on the internet and having customers. Maybe I'm just a hopeless relic of the old economy, but I still feel that on many issues of inter-



net strategy you've got to declare which side you are on.

In the business-to-business world, many e-commerce hubs, exchanges or networks are trying to be all things to all customers. Are they places to buy or sell surplus supply on the cheap, or are they going to create tight, collaborative relationships between buyers and sellers? Are they for hard-core buying or casual chatting? My sense is that if you try to do all of these things, you won't do any of them well. The cost structures, processes and management styles necessary to do one type of business well will leak into areas in which they don't fit. Despite the miraculous qualities of the internet, straddling business models within a business unit will ultimately lead to painful splits.

The recently announced mega-exchange for the Big Three automakers has elements—at least in the aspects of its design that have been announced—of both cheap source for marginal

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purchases and integrated core supplier market. The companies expect tens of billions in cost savings, which suggests that suppliers will be pitted against each other to submit lowball offers. But reports also suggest that some of the exchange's applications will include advanced planning and scheduling, demand forecasting and demand collaboration. That suggests close integration with suppliers. Has it occurred to anyone in Detroit or Stuttgart that these purposes might not be easily reconciled?

It has occurred to Toyota, whose participation in the exchange was actively sought by the other three partners. But in a *Financial Times* article on the exchange, Tadaaki Jagawa,

Despite the miraculous qualities of the internet, straddling business models within a business unit will ultimately lead to painful splits.

Toyota's head of procurement, noted that, "Our parts are not purchased through a bidding process. We buy them by building a relationship with our suppliers over time." Analysts suggest that Toyota's close relationships with suppliers are critical both to its high quality levels and its shorter new car development cycle than those of U.S. or European automakers. Toyota will participate in the exchange, but only on the margin: buying nuts and bolts and office supplies through it. In other words, Toyota views the exchange as a place to save a few bucks—er, yen—on stuff that really doesn't matter much to its business. Supplier integration with its business processes will take place not over the internet but through extended face-to-face negotiations and linkages between proprietary systems.

One reason that e-networks need to choose between low price and integration is that integration is surely going to be expensive. It took a decade and hundreds of meetings, for example, for the automobile industry to develop EDI standards and integrate with its suppliers using that technology. EDI is sometimes described as an expensive technology, but its cost pales in comparison to the human costs of agreeing on information and process standards. Suppliers can justifiably argue that they are supposed to post rock-bottom prices to get business on an exchange, while having to spend megabucks on integrating with car companies. The automakers will have to work closely with suppliers if they're going to meet their goals of rapid new car development and build-to-order manufacturing processes, so they won't be able to buy from the lowest-price supplier on the exchange. I'm predicting that the U.S. and German companies involved in the exchange will end up buying only commodity stuff, just as Toyota plans to do.

The Vertizontal Network

Another "have your cake and eat it too" situation can be found in the race to make vertical networks horizontal, and at the same time to augment e-content and e-community with e-commerce. Nobody's satisfied with their little niches. The trend today is to expand single vertical markets into multiple ones. VerticalNet is the paradigm of this strategy, having expanded into more than 50 different industries. That worked fine when all it offered was trade publication content and advertising, which was its original business model. But then it became clear that all those industries would eventually be offered e-commerce transactions through exchanges, and VerticalNet needed

to grow. Transaction-based revenues are often more lucrative than relying on advertising. However, it's going to be tough for VerticalNet to convince content viewers to become exchange participants. Readers of SolidWaste.com, for example, have often built up relationships with industry colleagues over years

at trade shows, golf games and other face-to-face settings. Moving the relationships online may simply not work, or may take too long for VerticalNet to profit from them.

Other companies that previously specialized in one kind of product or industry are expanding. Chemdex, which sells laboratory equipment online to the life sciences industry, has announced that it will diversify into other types of products and markets. In fact, the company is no longer Chemdex—that's just one of its offerings—but Ventro, a general provider of B-to-B marketplaces. Why make the shift? Because there are only so many dollars one can wring out of distributing beakers and Bunsen burners.

But what do Chemdex's customers lose when Ventro goes multivertical? Perhaps nothing initially. But eventually the people who specialized in the laboratory and life sciences markets will be asked to focus on other kinds of markets as well. The knowledge of industry people, processes and products will get watered down. Wall Street analysts may applaud such diversification, but I expect that over the long run customers will decry it.

In short, this is yet another area in which the rules of e-commerce will converge with the rules of commerce: Stick to your knitting. Don't get stuck in the middle. Strategy is about choices. Isn't it great that we can get new life out of these old business clichés by applying them to electronic commerce? **CIO**

Tom Davenport pontificates at both Andersen Consulting's Institute for Strategic Change and Babson College. He welcomes reader comments at davenport@cio.com.



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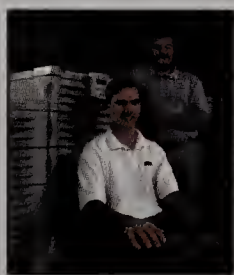
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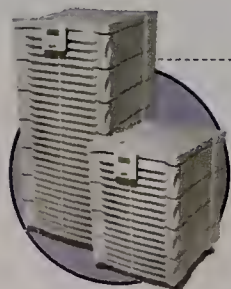
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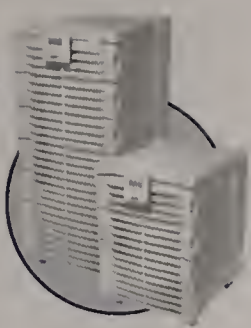
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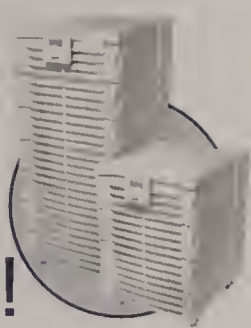
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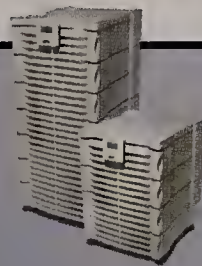
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Total Leadership

Inspiring Minds

Part of being a great leader is finding ways to inspire those around you

BY PATRICIA WALLINGTON

*"Their's not to make reply,
Their's not to reason why,
Their's but to do and die:
Into the valley of Death
Rode the six hundred."*

—from *The Charge of the Light Brigade*, by
Alfred Lord Tennyson

My fascination with leadership began when I had to study this poem as a child. I could never understand why the six hundred followed their leader knowing they were facing sure death. I asked why so many times my teacher sent home a note saying I was being disruptive in class. Fortunately, I was not dissuaded from my quest to understand great leaders.

Think of some of the inspirational leaders of the past: Mahatma Gandhi, Winston Churchill, George Patton, Mother Teresa. What did they have in common? Passion for a cause, commitment, vision, energy, courage. Make your own list. One of the best ways to become an inspirational leader is to study those who are. Better yet, work for one and learn from her.

Early in my career I had two experiences with what I'll call



inspirational leaders. One remains my favorite boss. First, he was always accessible. No matter how busy he was, he made time for me. To me, it meant I mattered. Second, he never solved my problems. Instead, he gave me guidance in the form of principles that could be used over and over again for different situations. Some examples: "Kill your enemy with kindness"; "Always take the high road—in the long run, it is the winning strategy"; "Win the war, not the battle." Third, he encouraged me by praising my strengths. It was up to me to use them to succeed. Last, and maybe most important, he "lifted me up." He made me feel I could do anything. Isn't that what inspiration is all about?

Here are some characteristics to emulate if you want to become an inspirational leader:

Passion and Vision: People are drawn to those who have a

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vision and a passion for their cause. In our field this should be an easy one. The mix of the new technology and the transitional state of business as we move from the old economy into the new economy makes exciting opportunities easy picking. If you work in your own areas of deep interest, the passion surfaces with no difficulty. Then create the vision for others to see. Finding the words, drawing the pictures that capture the imagination is a skill that can be learned and practiced. Think of famous inspirational words that still reverberate today, such as Martin Luther King's "I have a dream...."

Will and Determination: Some people commit to accomplish, others try to accomplish, but great leaders *intend* to accomplish. They have a will and determination that knows no

charisma—their social, extroverted personalities draw people to them like a magnet. Either way, great leaders manage to find a common ground with people and build rapport.

Authenticity: Say what you mean; mean what you say. Meet commitments. Be predictable. Set the example of what you want people to be.

Connectedness: Inspiring leaders connect with ideas by listening intently with open minds and learning from everyone. They connect with people by looking at them directly. They see people for who they are and what they know—not what they are and who they know. Finally, they connect with results by getting things done.

The best leaders can readily describe their failures; only the mediocre have none to remember.

boundaries. No matter the number of distractions, they keep their eye on the target. They see obstacles as only those things you need to get past to reach the target.

Courage: Aristotle believed that courage is the first of all virtues because it makes the others possible. There is an element of personal risk-taking in the deeds of great leaders. They do not have a "what's in it for me" attitude. They take on the "big idea." There is a willingness to take a stand even if it is controversial or politically incorrect. With this goes the willingness to take responsibility and accountability for results.

Confidence: Fear of failure is not an attribute of inspiring leaders. They take failure in stride—not satisfied that it occurred, but not devastated, either. The best leaders can readily describe their failures; only the mediocre have none to remember. Learn from these great leaders and try again. Have the confidence to make the big decisions and move on.

Caring: The ability to empathize with others and understand their individual motivations is a hallmark of leadership. Great leaders find many ways to meet people's needs. They care enough to expect a lot from their people, and they believe in them. They engender tremendous loyalty as a result. When someone cares about you personally it creates a solid bond.

Charisma: There are leaders with low-key personalities who inspire great devotion, and there are also many who have great

You might think some people are born leaders. But there are surely days when even the greatest are neither inspired nor inspiring. On the flip side, sometimes events raise people to a greatness they've never shown and may never exhibit again.

One example I've seen was in a large company undertaking a huge, risky project. Most times in this company people would avoid this type of project because of the risk of failure. In this case, though, the project leader was so passionate about the possibilities and the positive outcomes that he created a sort of mystique around this project. Others began to see it as a chance of a lifetime. Before you knew it, people were volunteering right and left. Needless to say, it was a huge success.

What raised this project leader to the level of greatness in this instance? His real commitment to the outcome? His ability to see the vision? His determination to get it done? All of the above. Can he sustain this inspirational leadership? That's up to him.

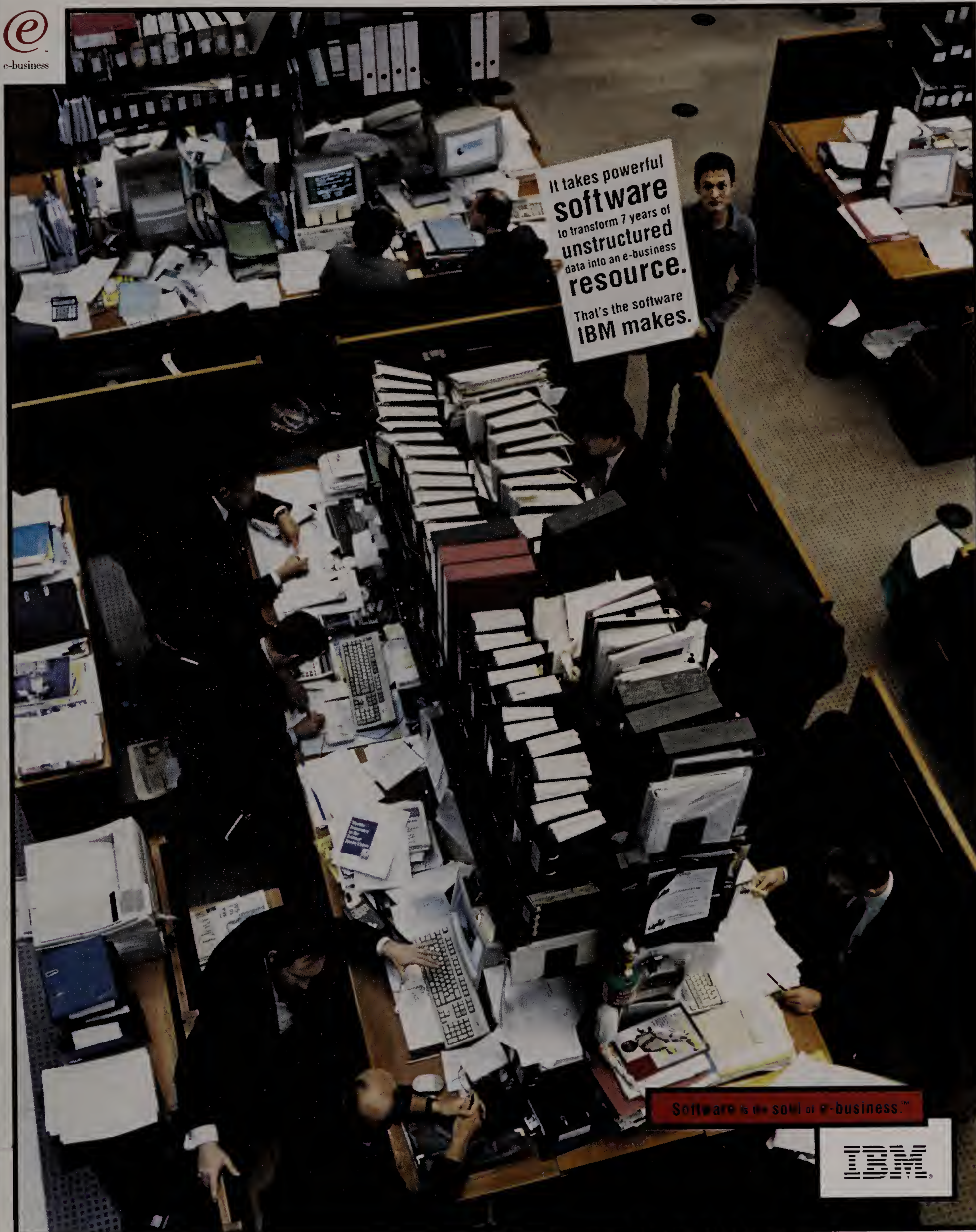
And it is up to you. Try to work for an inspiring leader, try even harder to become one and to give back to the profession by developing new ones. The opportunities are bountiful. There is such a body of knowledge resident in this community, such a creative force, so many big ideas waiting to be championed. **CIO**

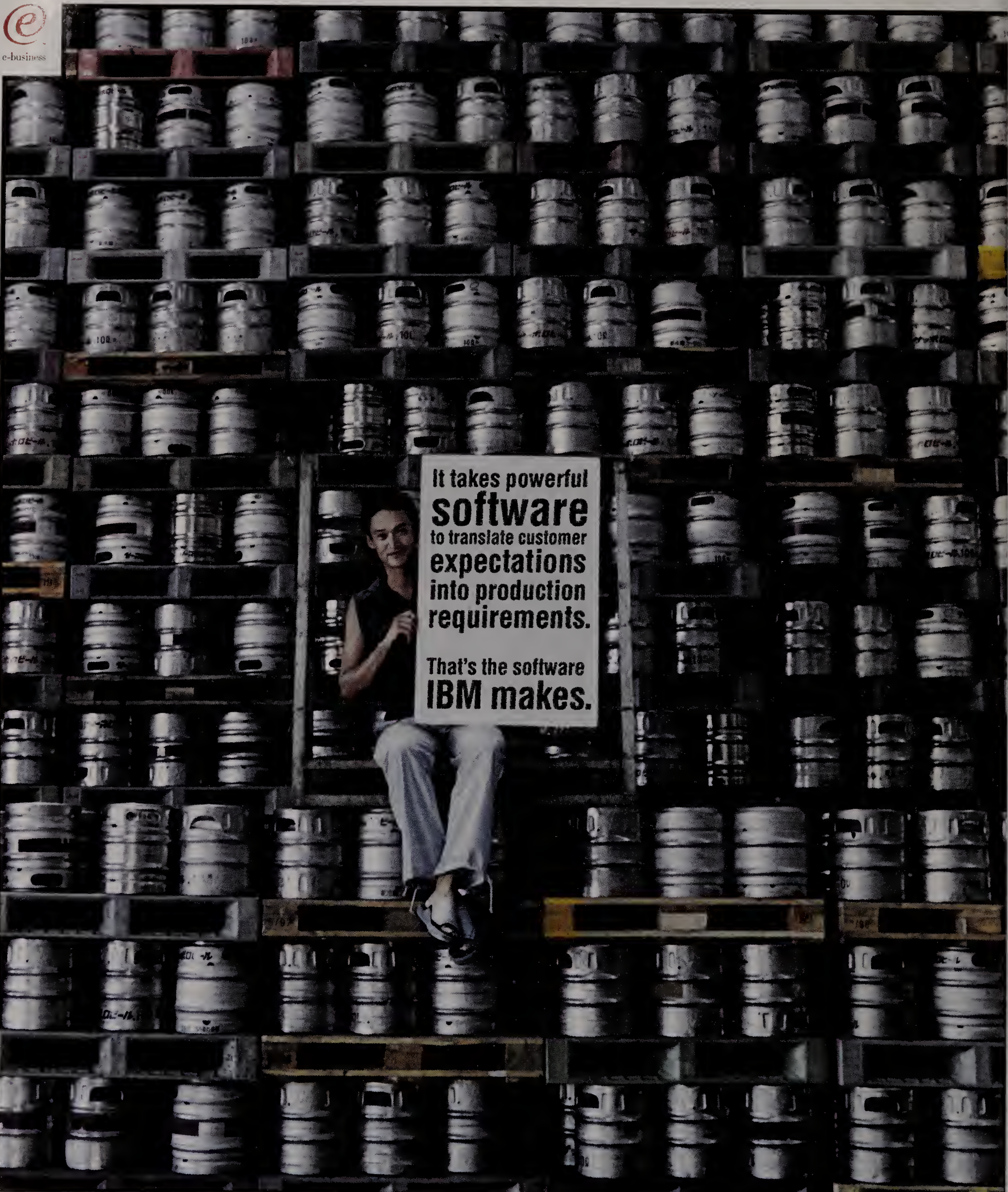
Send your own tales of inspiration or other thoughts about our ongoing Total Leadership column to leadership@cio.com.

Before retiring in 1999, Patricia Wallington was corporate vice president and CIO at Xerox Corp. In 1997, Wallington, now president of CIO Associates based in Sarasota, Fla., was inducted into the Women in Science and Technology Hall of Fame and named by *CIO* one of the 12 most influential IT executives of the decade.



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"Just because someone has been arrested for hacking doesn't mean he's a criminal," says convicted hacker KEVIN MITNICK.

PRO AND CON

BY DAINTRY DUFFY

Reader ROI

Learn why hiring hackers requires careful consideration

See how some companies are growing their own hackers

Discover what skills CIOs should look for in security partners

What do you get when you hire a hacker to solve your security woes? If you're not careful, you can get more than you bargained for. Here's how to do it right.



AFTER ATTENDING ERNST & YOUNG'S "EXTREME HACKING" COURSE, **RICKY SOLER**, INFORMATION SECURITY ANALYST WITH FIDUCIARY TRUST, WAS SURPRISED TO LEARN HOW EASY HACKING REALLY IS.

All the hackers had to go on were five innocuous e-mail messages. Within four hours, they had taken control of their target's bank account, changed his password and locked him out. They had also acquired his credit card numbers, the details of his driving record and his salary to the penny. For the coup de grâce, they infiltrated his office and left a puckish note on his desk: "Hi Matt, from your friends at Jaws."

Luckily for this target, Matthew McClearn, these hackers were invited guests and not intruders. Part of a so-called penetration testing team for Calgary, Alberta-based Jaws Technologies, they'd been challenged by McClearn and his employer, the *Calgary Herald*, to take the five e-mails and learn as much about the reporter as they could in a week. Using a combination of technical skill and social engineering (the art of persuading

people to give out sensitive information), the Jaws team rapidly created a file of information on McClearn. In addition to the data above, the file contained printouts of all his bank transactions for the past few months as well as the names of friends, family members and colleagues, who in turn could have been targeted by real intruders. In the wrong hands, this situation could have been a consumer and corporate security nightmare.



CIOs should get to know potential security consultants personally and not rely on their résumés, advises ex-hacker BRIAN MARTIN.

While not a new trend, penetration testing, or testing security from the perspective of a would-be intruder, has gained significant appeal in the wake of recent attacks on high-profile companies like Yahoo and CNN. Long-standing fears about security vulnerabilities have been brought uncomfortably close to the surface for CIOs and the executive boards to which they answer, and the realization that there is no such thing as 100 percent security has companies looking for any edge they can get. As soon as security holes are found and patched, new ones appear, and while the IT departments of many corporations are perpetually understaffed, hackers, crackers, sneakers and phreakers (see "Cast of Characters," Page 84) seem to prosper and proliferate. To mix a metaphor, desperate times make for strange bedfellows, and CIOs are forging some unconventional alliances in their mission to bolster corporate security.

Take for example, Kevin Mitnick, the infamous 36-year-old hacker who served five years in federal prison for breaking into the computer systems of some of the nation's biggest businesses (see "Conversation with Kevin Mitnick," this page). Since his release from prison earlier this year, Mitnick's future as a security consultant appears to be quite bright. In March, he met with the Senate's Governmental Affairs Committee to advise it on how easy it is to break through government and corporate security systems. And at a recent CIO conference, 31 percent of the 191 information executives said they would hire Mitnick to advise them on security preparedness after he meets the terms of his three-year parole (which bars him from using a computer, cellular phone or any device with an internet connection).

The reasoning behind this is quite simple, according to Mitnick. "I have real-world experience circumventing security measures," he says. "And that might be more attractive [to a CIO] than hiring somebody right out of school who has a degree in information security but no practical experience. Companies are more interested in experience than education."

That kind of real-world experience can also be found at the various security vendors, many of which claim to employ former hackers, reformed hackers or ethical hackers. But what differentiates the hacker working for a security vendor from the pasty-faced, teenage loner orchestrating hacks from his parents' basement? In some cases, not a lot, and before hiring a hacker or a security company that employs hackers, CIOs have to be prepared to ask the right questions. "Many companies feel that somehow a hacker is adding value," says Mike Higgins, president and cofounder of Alexandria, Va.-based Para-Protect Services. "What they don't understand is that they have a tiger by the tail."

MEETTHECAST

Before weighing the pros and cons of hiring a hacker, let's first clarify what we mean by hacker. In the multilayered social strata of the underground, the term differs greatly from the way it's used in the mainstream media. To be called a hacker does not suggest that one is a criminal; it simply connotes a level of skill and a curiosity to explore sys-

CONVERSATION WITH KEVIN MITNICK

Kevin Mitnick, perhaps the nation's most notorious hacker, talked to us recently about hackers, corporate security and where companies are most vulnerable

CIO: What should CIOs consider before hiring hackers?

Mitnick: Just because somebody is a hacker doesn't mean he has the skill set to do the job. A hacker might be really good at getting through security measures on a Windows NT box but not good at creating policies and procedures to protect a company.

CIO: What's your opinion of the perpetrators of the recent denial-of-service attacks?

Mitnick: When the media labels those individuals as hackers, it distorts the definition and gives hackers a bad name. You know, it's interesting, Steve Jobs and Steve Wozniak started off as hackers; that's how they obtained their skills. Yet they weren't people who were looking to do damage.

CIO: How vulnerable to hacking are the majority of companies?

Mitnick: Given the sufficient resources, time and money, any computer system or network is vulnerable. CIOs should increase security only to the point that it is cost effective, enough to drive the hacker on to the next person. It's like the security of putting The Club on the steering wheel. Somebody could still break into the car, but it's probably easier to move on to the next one.

CIO: Should CIOs be wary of individuals with computer-related criminal records?

Mitnick: Just because someone has been arrested for hacking, doesn't mean he is a criminal. [The offense] could have been very benign. He could be a hacker who worked in a bank and circumvented money to an account to steal it, or he could just be a computer enthusiast circumventing security for other purposes, not to cause harm.

CIO: What should CIOs worry most about in their security infrastructures?

Mitnick: The weakest link in the chain is always the human element. You can have the newest security tools to protect your technology, but in the end, if you have a \$7- or \$8-per-hour person using the equipment, that can be exploited by a hacker. The less knowledgeable the people are, the easier it is [for hackers to exploit them].

—D. Duffy

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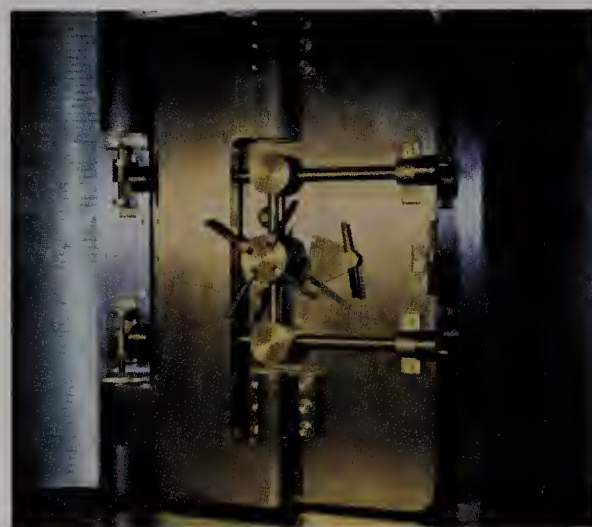
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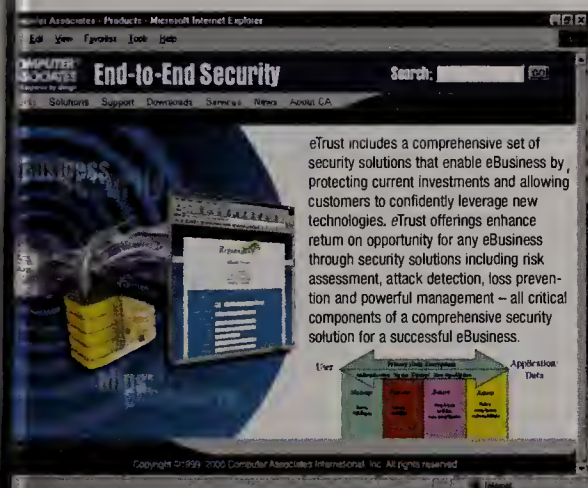
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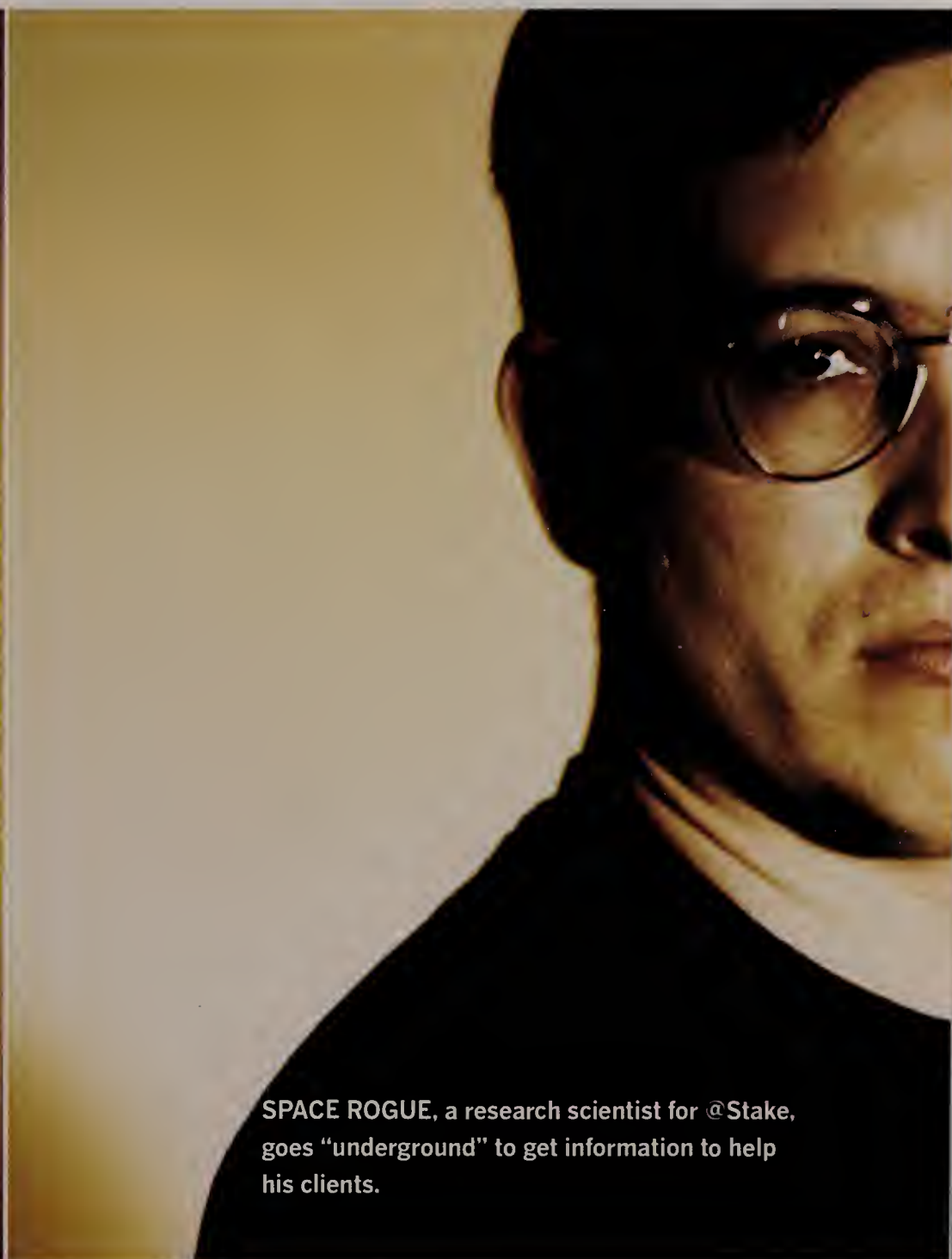
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WRITE A PASSWORD-CRACKING PROGRAM
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HOW TO USE IT, ASSERTS **WELD POND**,
RESEARCH SCIENTIST FOR @STAKE.



SPACE ROGUE, a research scientist for @Stake, goes "underground" to get information to help his clients.

tems. The malicious work is done by individuals referred to as crackers. In common parlance, the two types are known as white-hat and black-hat hackers. Somewhere in the middle are the gray-hat hackers, who no longer actively engage in malicious hacks but maintain their ties to the underground to stay abreast of new exploits and techniques.

Gray-hat hackers, like those found in L0pht Heavy Industries, the recently acquired R&D group of @Stake, a newly formed e-commerce security company, often have a greater level of experience with the tools used by hackers. "If you're researching vulnerabilities, do you want to hire somebody who can use LockCrack [a password cracking program] or somebody who wrote LockCrack?" asks Weld Pond, a research scientist with Cambridge, Mass.-based @Stake.

Obviously, the value of hiring well-known hacker groups like L0pht is that you know what you're getting. Plenty of vandals who call themselves hackers can break into systems and make a mess, according to Ken Ammon, founder and CEO of Herndon, Va.-based Network Securities Technologies. But you never see a true hacker's attack com-

ing, and it's often impossible to even detect the damage he has done or where he broke in. It's in combating that kind of foe that attack and penetration skills become invaluable. "If you're never going to hire a hacker, you're never going to catch a hacker," says Ammon.

One of the chief benefits of working with some breeds of hackers, like the gray-hats, is that they often have access to information about known security holes and hacking exploits that a CIO, or a suit in hacker-speak, could never get. Through chat groups and message boards, which corporate IT staffers generally don't have the time or the inclination to visit, hackers discuss, post and exchange information about security problems. When a company learns about a vulnerability, it often fixes its own systems but buries any information about the problem for fear it might become public. While this may be a smart move from a public relations standpoint, it also means that while hackers are freely exchanging information about vulnerabilities and exploits, companies are by and large kept in the dark.

Space Rogue (like other hackers, he prefers to use his alias), a research scientist for @Stake and a member of L0pht, considers his ties to the underground a valuable resource for the companies he works with. "The underground doesn't post information [for companies to see]. They want to keep it to themselves," he points out. "By having contacts with these sorts of people, we get hints about where to look for holes, we find them and publicize the problem."

Hackers also have rather traditional methods for sharing their information through vehicles like the online Hacker News Network Attrition.org, where a page called "mirror" reports pages of corporate websites that have been hacked and defaced, and a variety of internet relay chat sites. CIOs can certainly send their own systems administrators to these sites, but few companies have the resources to dedicate to the cause, and there is also a danger to having corporate employees surfing these pages freely. Many times, for example, hackers set up the sites with sniffers (a program that monitors IP packets traversing a local network), and if one of your employees is searching for information on Windows NT vulnerabilities, well, there's got to be a reason. A hacker is now armed with some very valuable information about where your systems may be weak.

A CIO should be aware that although penetration testing can provide enormous value, it has limits. "Breaking in is easy," says Fred J.

Rica, a partner and national threat and vulnerability assessment leader with PricewaterhouseCoopers' technology risk services division in Morristown, N.J. "I can teach anyone to be a hacker." But that alone doesn't help the company strengthen security. There has to be a certain level of business knowledge and understanding involved in order to not only fix the problems, but also create a security policy that will prevent recurrence. According to Rica, that may not be the average hacker's strong suit. CIOs should also understand that a penetration test is just a snapshot of the network at that point in time. The holes that are there today can be fixed, but new ones can be created every time something is changed on the network.

Penetration testing should be viewed as an occasional test for the strength of its defenses rather than the vulnerability of its weaknesses, says Al Decker, director of security and privacy services for IBM Global Services in Cary, N.C. Rather than throwing a brick right through the window, Decker suggests that companies check for the network equivalent of safety glass. If there's a screen in place, safety glass in the windows and a fence outside, "then I'll throw that brick," he adds.

HOW TO PROTECT YOUR COMPANY

Once a company is sold on the value of hiring a hacker, it has to know how to mitigate the potential security risk of doing so—steps that CIOs should consider whether they're hiring a hacker or a new

systems administrator. Whether the hacker works directly for the company or through a third-party vendor, CIOs need to conduct a thorough background check on each individual being considered. For a hacker hire, however, the check takes on a bit more significance because any criminal history where computers were involved should be an automatic red flag. Some, like ex-convict and hacker poster boy Mitnick, argue that because some computer crimes are committed out of intellectual curiosity rather than the desire for personal gain, those crimes should not preclude hackers from working as IT security professionals. But CIOs should weigh that risk carefully.

Companies should also check references. It's important to look carefully at the résumés of all who will be working on their systems and ask if those individuals are employees of the company or subcontractors. Even if the individuals are part of a security vendor's on-staff team, don't presume that the background work has already been done.

Since hackers tend to develop a deep expertise in one or two par-

**ONE OF THE CHIEF BENEFITS OF
WORKING WITH SOME BREEDS OF HACKERS
IS THAT THEY OFTEN HAVE ACCESS TO INFORMATION
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EXPLOITS THAT A CIO COULD NEVER GET.**

ticular areas, certification can also provide some insight into the level of experience of prospective penetration testers. Most hackers doing it for illegal purposes wouldn't bother to put the time and effort into getting certified, so if the individual you're considering is a certified information system security professional or a systems network administrator professional, chances are good that person has the necessary skills and takes his work seriously. In addition, if you are working with a security vendor, require that it has both business insurance as well as key personnel clauses in the contract that will prevent companies from sending people other than those who were originally proposed to conduct the work. Such steps are important in establishing the reliability of the service provider.

Unfortunately, none of this information will tell you much about the ethics of the person in question. Rica of PricewaterhouseCoopers recounts the story of a client PWC snapped up. This client was on the rebound from a bad experience with a hacker who was providing penetration testing services. The company brought in the hacker to do some work, and the very next month *2600: The Hacker Quarterly* featured a cover story on how to hack into this particular company. Although the CIO couldn't prove a direct link, he decided that the two events were far too coincidental and fired the individual.

To prevent reading about your company's system secrets in the next issue of a hacker magazine, get a feel for the morals and inten-

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tions of the person by meeting with him face-to-face. Brian Martin, a 26-year-old ex-hacker and security consultant, advises CIOs to get to know these people personally and not rely on a piece of paper. "No matter what the résumé says, 15 minutes in a bar sipping beers and talking to them will tell you more about their background and ethics." Bringing penetration testers into the office for at least the initial portion of the engagement also provides the added bonus of creating an opportunity for the company's security personnel to learn from the penetration testers. When Ernst & Young's penetration testing team starts a new project with a client, for example, a staff member from the IT department they are working with sits in on the work they are performing. This creates an additional level of trust and an atmosphere of mutual education.

GROW YOUR OWN HACKERS

Many companies simply can't afford to risk their reputations by hiring gray- or black-hat hackers. So for them, developing hacking skills among the existing members of their IT staff is a very appealing option. Ernst & Young's Global Security Solutions center runs a one-week "extreme hacking" course out of its Kansas City, Mo., headquarters and in cities around the United States where its on-staff security experts will teach IT staff members the ins and outs of hacking.

The course offers segments on internet profiling (gathering information about a company's internet footprint), hacking Unix and NT, as well as more advanced techniques. It then follows up with labs where the students can work in groups, as many real-life hackers do, to actually hack a box that has been set up for them on a closed network. Ricky Soler, an information security analyst with Fiduciary Trust in New York City, attended one of the recent courses because his company is moving into e-commerce and wants to ensure that its systems can't be easily hacked. Soler, like most of the students, was surprised by how easy hacking actually is. "The first couple [NT and Unix] were particularly easy; we were able to hijack the password, run the cracker and we were in."

Many of the instructors come from three-letter government agencies such as the CIA, the FBI and the NSA. Ron Nguyen came from San Antonio's Air Force Information Warfare Center, where he studied the attack and penetration techniques used by hackers and developed customer countermeasures to detect and thwart their preferred methods of attack. The difference between the Air Force and corporate America is not that great either. Most security vulnerabilities in both areas are still caused by simple configuration errors, outdated firewall access control lists or a user's easily guessed password. In addition to teaching his students all about hacking, Nguyen makes a point to reinforce the basics of good information security practices.

As for corporate security professionals like Soler, one of the biggest benefits of attending the course—aside from the knowledge gained—is the relationships it created. One of the key points pushed by the extreme hacking instructors is the importance of networking with

CAST OF CHARACTERS

Who's who in the world of hackers, according to the online hacker Jargon File

Cracker: A malicious meddler who tries to discover sensitive information by breaking into computer systems. Cracking usually involves the dogged repetition of well-known tricks that exploit common weaknesses in the security of target systems.

Hacker: A person who enjoys exploring the details of programmable systems and how to stretch their capabilities. Hackers also relish the intellectual challenge of creatively overcoming or circumventing limitations.

Phreaker: One who practices the art and science of cracking the phone network (for example, to make free long-distance calls).

Samurai: A hacker who is hired for legal cracking jobs, snooping for factions in corporate political fights, lawyers pursuing privacy rights and First Amendment cases, and other parties with legitimate reasons to need an electronic locksmith.

Script Kiddies: The lowest form of cracker, script kiddies do mischief with scripts and programs written by others, often without understanding the exploit.

Sneaker: An individual hired to break into places to test their security.

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fellow students. In the future, when Soler runs up against a security problem or questions, he'll be able to call his fellow classmates to talk about how they may have dealt with the same issue.

Regardless of whether you choose to hire penetration testers or not, hackers need to be taken seriously. Michael L. Puldy, who heads IBM's Emergency Response Service, points to events like Defcon, the annual gathering of serious computer hackers, enthusiasts and undercover feds as evidence that hackers are going somewhat mainstream. "There are people from the FBI and the State Department there because they want to hear what the philosophies are," says Puldy. Companies can also learn a great deal by boning up on the methods and exploits of the hacker community; they just need to give careful consideration to how they go about it. **CIO**

Daintry Duffy, senior writer and fledgling hacker, goes by the screen name Coolio...whoops...Julio. She can be reached at dduffy@cio.com.



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As ERP implementations falter and fail, many people think the answer is more training. They're wrong.

ERP Training Stinks

BY MALCOLM WHEATLEY

Unless you've been as out-of-touch as the Mars Polar Lander, you're doubtlessly aware that the ERP industry hasn't been performing like the marvel it was first made out to be.

First came the ERP vendors' pre-Y2K plunging sales revenues and falling stock values. Second came the realization that all that hard

work implementing an ERP system didn't actually guarantee business benefits—or even a positive payback. Take Meta Group's damning finding, for instance: The average ERP implementation takes 23 months, has a total cost of ownership of \$15 million

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- ▶ Learn how training differs from education
- ▶ Find out why it's better to keep the training in-house
- ▶ Understand why CIOs should be cautious of industry average training budgets



and rewards (so to speak) the business with an average negative net present value of \$1.5 million. And the news gets worse.

An alarmingly long list of top-drawer integrators have fallen flat on their faces. Compared to these disasters, merely spending a lot of money on an ERP implementation that achieves very little is a consummation devoutly to be wished.

Hershey, Pa.-based Hershey Foods, for example, issued two profit warnings in as many months in the run-up to last Christmas. Why? Massive distribution problems following a flawed implementation of SAP's R/3 ERP system, which affected shipments to stores in the peak Halloween and pre-Christmas sales periods. In a booming stock market, Hershey shares ended the year down 27 percent from its year's high.

And Hershey wasn't alone in its misery. In November 1999, domestic appliance manufacturer Whirlpool of Benton Harbor, Mich., also blamed shipping delays on difficulties associated with its SAP R/3 implementation. Like Hershey, Whirlpool's share price dove south on the news, falling from well over \$70 to below \$60. While these two have (so far) been the highest-profile implementation debacles, companies as diverse as Scottsdale, Ariz.-based trash processor Allied Waste Industries; Newark, Del.-based high-tech fabric maker W.L. Gore & Associates; and industrial supplies distributor W.W. Grainger of Lake Forest, Ill., have all reported serious difficulties.

And if "serious difficulties" sounds bad, rest assured it can get much, much worse. After Carrollton, Texas-based pharmaceutical distributor FoxMeyer Drug actually collapsed following an SAP R/3 implementation, its bankruptcy trustees filed a \$500 million lawsuit in 1998 against the German ERP giant, and another \$500 million suit against co-implementer Andersen Consulting. (Both cases were unresolved at the time of writing.)

So what's going on? The good news—if that's the right word—is that most experts agree that such failures are not systemic. "Very rarely are there instances when it's the ERP system itself—the actual software—that fails," says Jim Shepherd, senior vice president of research at Boston-based AMR Research. Public pronouncements by both SAP and Hershey, he notes, have acknowledged that the software does what it is supposed to and that no big fixes or patches are planned. What's more, he adds, the prudent observer will differentiate between real implementation failures and not-so-real failures. "Blaming the failure on a system implementation has become a convenient excuse for companies that have missed their quarter-end [earnings] target."

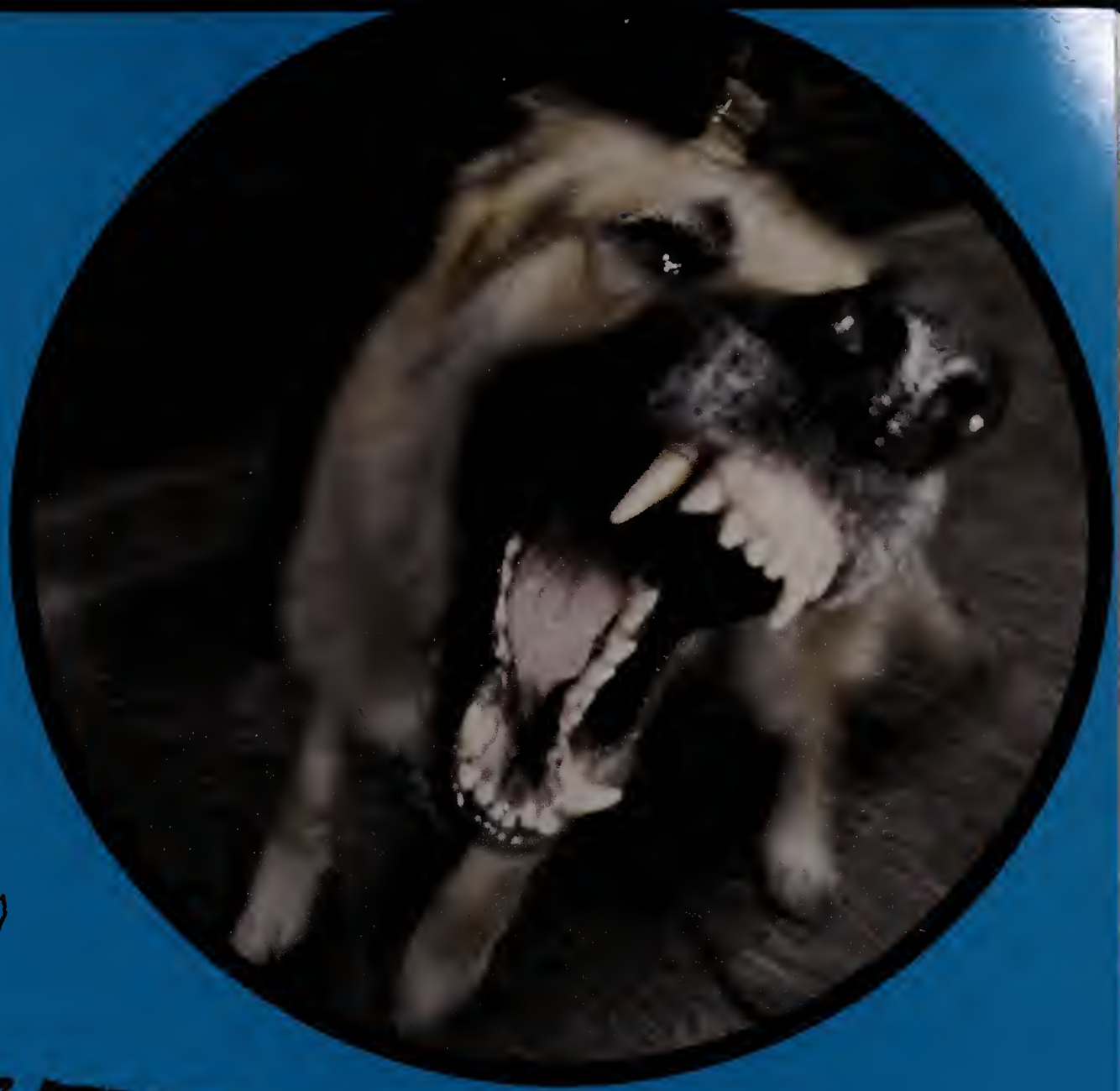
As for blame, it is evenly spread. SAP implementations are no more likely to go down the tubes than ERP systems from other vendors:

W.L. Gore's system, for example, came from Pleasanton, Calif.-based PeopleSoft. "When an ERP project unravels, or is seen not to perform well, one of the suppliers is usually chosen as the culprit," says David Duray, London-based global partner responsible for the SAP implementation business at PricewaterhouseCoopers. "In my experience, this is usually more of a political decision than a proper problem-source identification exercise—and SAP, over the last few years, has been a popular target."

Furthermore, adds Roger Phillips, an IT analyst at specialist investment bank Granville in London, which tracks the global ERP market,



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Stop Hackers Cold

there is no evidence that geography is a significant differentiator in the success stakes. Disasters, he believes, “simply go with the ERP territory.” There are, he says, “no cultural or managerial foibles that make American ERP implementations any more predisposed to disasters than any other country’s implementations.”

So what does lie behind ERP disasters? And behind the rather longer list of costly-but-underwhelming implementations typified by that now-infamous Meta Group report? Increasingly, experts reckon that they’ve found the smoking gun: poor training. Not the technical training of the core team of people who are installing the software, but the education of the broad user community of managers and employees who are supposed to actually run the business with it.

So Much Training, So Little Benefit

As few as 10 percent to 15 percent of ERP implementations have a smooth introduction that delivers the anticipated benefits, says A. Blanton Godfrey, chairman and CEO of the Juran Institute, a Wilton, Conn.-based consultancy. The remainder either experience teething problems or a significant shortfall in delivered benefits—with a full 30 percent of companies receiving what he calls “a nasty surprise.” It’s not a disaster of Hershey or Whirlpool dimensions, but it’s still a kick in the teeth. The fascinating variable to look at, according to Godfrey, is what characterizes the lucky 10 percent to 15 percent. It’s not luck; it’s better training.

In one sense, this isn’t new. Everyone knows that training is important. Especially the ERP software vendors themselves, who earn handy revenues from design-once, recycle-many-times training courses. And most especially third-party training vendors, the bulk of whose livelihoods come from running courses on how to operate an ERP vendor’s system. And just look at the mind-blowing variety of training formats available: web-based virtual classrooms, computer-based training, knowledge warehouses, video courses, self-study books, pop-up help screens... an almost endless menu to suit almost every need and budget.

The provision of all that training, points out Cushing Anderson, a senior research analyst with Framingham, Mass.-based IDC (a CIO sister company), has become a giant business in its own right. Revenues for web-based ERP training in the United States alone were \$915 million in 1998, projected to grow to \$2.8 billion in 2003. The logic is inexorable, he says: “The better the training, the faster you’ll see the business metrics move in the direction you’re looking for.”

But the consensus that’s emerging is that the training that matters isn’t techy, “this field shows this; this button does that” training. In fact, what we normally call training is increasingly being shown to be relatively worthless. What’s called for, it seems, is an ability to figure out the underlying flow of information through the business itself.



The traditional view of training may blind the unwary to its significance and to the tightly woven links that exist between training, change management and staff adequacy.

The Why Versus the How

The first problem is that word: *training*. It conjures up images of dogs jumping through hoops. This is not helpful.

“I separate training into two parts—education and training,” says John Conklin, vice president and CIO of World Kitchen (formerly Corning Consumer Products Co., manufacturer of Pyrex and Corningware) of Elmira, N.Y. “Education is all the why, who and where issues,” Conklin says. “Training is the how part of the equation.” And of the two, he says, “education is the bigger piece of the puzzle. If people don’t go through this education, you won’t have their hearts and you won’t have their minds.”

There’s a tendency for companies to fall into the trap of putting employees through training programs that are too software-specific—an easy mistake to make, but one that ignores the fact that ERP systems are designed to operate by (literally) codifying a set of business processes. “No matter what application an organization is implementing, they are usually better at the keystroke and transaction training than they are at the business-and-people processes education,” says IDC’s Anderson.

And providing that education can be tricky. When St. Louis-based Purina Mills implemented SAP R/3 in its 55 plants, the commercial animal-feed producer outsourced the training task to a third party, says Operations Control Director Steve Hunt. In-house resource constraints were a factor, says Hunt—the company wanted its best

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"We made the mistake of teaching everybody how to do their job but nothing else.... They didn't understand the ERP process, the degree of integration and the importance of data being right."

—Keith Bearden, director of IS and CIO, A-dec

people implementing, not training. But also, he says, "We assumed that a third party training partner would add valuable insight into training techniques that had already been proven in their previous implementations."

The result was an awkward first day, which, Hunt recalls, "saw end users at the very first break on the very first day of training stating that they were going home unless someone came into the classroom to help them translate the material." The problem? "A complete system change is like learning a language," explains Hunt. "In the beginning, you need to translate the new language into the old in order to understand the meaning. In this case, our trainers couldn't provide that translation, as they didn't understand our processes—for example, they could demonstrate how to enter a goods receipt, but they couldn't explain when you should do it, or how to find the right purchase order to apply it to."

In the end, says Hunt, it became clear that the training company just wasn't up to the job. "We asked them to leave at the end of the first week." Rather than opt for another third-party provider, Hunt and his team spent six months constructing a course that they could deliver themselves—and did so, in a complete reversal of the original strategy.

What Hunt and Purina Mills discovered was that what their employees really wanted and needed to learn about was the whys, wheres and whos of the business process not the hows of the ERP system.

"Companies often mistakenly regard SAP implementation as a purely technical issue," affirms Byron Fiman, principal and cofounder of Implementation Management Associates, a Brighton, Colo.-based change management consultancy. "In fact, at least half the issues in ERP disasters are not technical but people related and culture related." In terms of getting things right, he adds, "the soft stuff is really the hard stuff."

And even if a Hershey- or Whirlpool-style disaster doesn't loom, a failure to deliver benefits is all too likely. "The screens are up, but nothing has changed: the cycle times are the same, customer satisfaction metrics don't shift and the costs remain the same," Fiman says. The problem is that too many companies pay lip service to the education part of the pre-ERP change management process. "Every SAP implementation partner says that training is important, but it's often one of the first things to go when the talks about pricing get tough."

Millions for Software, Pennies for Understanding

"Too many companies treat training as a check-the-box activity," says Dan Klein, vice president of education services at PeopleSoft. "The resulting mind-set: 'Did you train the users?' 'Yup, we trained the users.'"

Just as common, training typically occurs at the end of the implementation cycle, when activities are often running late and being compressed. So training, too, gets squashed in as a last-minute activity. "One of my favorite questions," Klein says, "when speaking at user seminars is to ask, 'How many people would go about their training differently on their next implementation?' Seventy-five percent of the people put their hands up and say that next time they'd allow more time for it, and that they'd tailor it more around their own business processes."

A typical result of such skimping, says David Beresford, executive director of one of Europe's premier SAP rescue services, systems implementation consultancy Diagonal, of Farnham, England, is that users often fail to appreciate the consequences of their actions—with





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disastrous results. Informal practices that worked just fine in the era of paper procedures or standalone legacy systems can have catastrophic effects on an integrated ERP environment.

"The classic example is the sales order process," says Beresford. "In the past, people could put in the wrong price, the wrong customer, the wrong delivery point—and somehow, the business coped. Now, surprise, surprise, they don't get their invoice paid. And it's even worse if the wrong product is entered. What people need to understand is that the sales orders are now automatically linked to the manufacturing and accounting functions."

They didn't understand this at A-dec, a privately held dental equipment manufacturer headquartered in Newberg, Ore., which went live with a Baan system in 1997. "We made the mistake of teaching everybody how to do their job but nothing else," says Director of IS and CIO Keith Bearden. "Everybody knew the keystrokes to do their job, but that was all. They didn't understand the ERP process, the degree of integration and the importance of data being right. A clerk would enter an order incorrectly and manufacturing would start making it. Changes to sales orders after we'd started manufacturing were a real problem."

Six months later, Bearden threw in the towel and conceded that users needed better training. But how? Baan ran a course, but it lasted a week, cost \$5,000 per head and, Bearden decided, wasn't about A-dec's business processes. So the company decided to develop a course itself, using instructing staff from Portland State University's business school. "Folks from the university came to the business, talked to people about how we operated and worked with a team from inside A-dec to develop the course and then give it," says Bearden. In all, some 450 employees went through the one-day course during the summer and early fall of 1998.

"The human-factor side of ERP—understanding the relationship



between the people in receiving, shipping, manufacturing and the customer—is crucially important," adds Johnnie Foster, vice president and CIO of St. Louis-based specialty chemical manufacturer Solutia. The timetable for Solutia's own SAP R/3 implementation, which concluded in May 1999, he adds, was driven both by the need to achieve Y2K compliance as well as separate from former parent Monsanto. "Now we're going back, taking it to another level and getting people to better understand their role in the process: This is what you're doing, this is why you're doing it and here's how it impacts other people," he says.

The Black Hole of Middle Management

Without understanding the whys of the process, decisions that would make sense in a pre-ERP environment quickly turn sour—particularly when those decisions are made by middle managers whose day-to-day tasks revolve not around the computer screen but the directing of people who sit at the computer. "We call it the black hole of middle management," says Implementation Management Associates' Fiman. The problem that he identifies is one of cultural inertia. "Companies have confused culture with wallet cards," he says, referring to the printed crib sheets on which businesses set out their value statements and mission statements in a handy-but-forgettable format. The result? Managers who talk the talk but walk any which way they choose.

Consequently, when companies hit Hershey-style problems, there's an instinctive middle management reaction to ship products to customers rather than lose sales even if that means circumventing the sys-



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“Senior managers often don’t particularly want to be told that there’s a high level of risk and that there’s a great deal of expenditure involved in minimizing it.”

—Jim Shepherd, senior vice president of research, AMR Research

tem, says David Dobrin, chief business architect at Benchmarking Partners in Cambridge, Mass. And, says Dobrin, that’s just about the worst thing you can do. Not only does the order still sit in the system, ostensibly unfulfilled, but the actual inventory is now out of whack with the inventory logged in the system. And without the shipment going through the system, it’s hard to raise an invoice. “The ship-it-anyway syndrome is definitely a lack of understanding,” slams Dobrin. “People need to know what an incredibly stupid idea that is.”

Training in how to operate the system will not, however, help the middle manager see down the road far enough to decide to forgo the short-term benefit of shipping product come what may. Only a broader-based, holistic education in the company’s ERP-mediated business processes will do that.

But if end-user and middle-management training is so important, why isn’t it given more priority? One answer, perversely, is that it is being given more priority—now. “Companies have begun to wake up to the fact that training is a key requirement,” says Patrick Newton, former CEO and president of third-party training company DA Consulting Group of Houston. Training as a proportion of overall budgeted project costs was typically around 5 percent as recently as two years ago, he notes, citing analysts’ published estimates. Now, he says, the figure has more than doubled, to around 11 percent of project budget.

While that is reassuring news, the analysts are less sanguine. “Very wide ranges make industry averages meaningless,” observes Debra Hofman, managing director of Benchmarking Partners, whose own study found that even though training averaged 8 percent of total project cost, the actual costs of training ranged anywhere from 1 percent to 30 percent. CIOs who aim for the average figure (and nearly every CIO interviewed for this story could instantly cite what percentage of their company’s implementation costs were dedicated to training) may therefore be running the risk of undershooting the target requirement.

Senior Doesn’t Mean Smarter

And therein lies another problem. ERP training needs to embrace senior management—and early on in the process, when budgets and timescales are still fluid, argues AMR Research’s Shepherd. “Senior managers often don’t particularly want



to be told that there’s a high level of risk and that there’s a great deal of expenditure involved in minimizing it,” he maintains. “It’s just not a message they want to hear.” The result is an invidious conspiracy of silence. “The people with the message don’t want to tell it, and the people to whom it should be told don’t want to hear it.”

In particular, he worries, the senior and middle management of American companies don’t have the extensive operating background of, say, their German counterparts. “Unlike in German companies, where managers have engineering degrees and shop floor experience, too many American managers have management degrees and have come from business school straight into a management role,” says Shepherd.

The result? A critical blind spot when it comes to understanding how their brand-new systems actually operate in the lives of their employees and on the shop floor. But with awful examples like Hershey and Whirlpool to focus their thoughts, companies may be expected to give some hard thought to eliminating that blind spot.

It’s either that, or that light you see at the end of the implementation tunnel will probably turn out to be that of an oncoming train. And you know how that story ends. **CIO**

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Malcolm Wheatley can be reached at malcolmwheatley@compuserve.com.



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"I have to make sure that everyone understands we have little control over the stock price on a daily basis."

—Phillip Merrick, webMethods

HOW I *Is the grass really greener on the other side of the IPO?* SURVIVED *These three companies are finding out.* MY IPO

BY BETH STACKPOLE

There are thousands of internet entrepreneurs who would like to be wearing Phillip Merrick's shoes. Merrick's company, webMethods, which makes software that facilitates business-to-business e-commerce, launched its initial public offering on Feb. 11, going out at \$35 a share. Weeks later, the Fairfax, Va.-based company's stock price shot up to over \$300, and the company, which had revenues of \$15 million in 1999, at one point had a market capitalization somewhere in the \$9 billion range. In March its stock price was trading in the low \$230s.

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“What we’re finding is a double-edged sword—with the stock low, there’s tremendous room for growth, but it’s easy for other companies to pick off employees because there’s not a lot holding people here other than their job and wanting to work in a particular segment of the industry.”

—Greg Sutyak, CFO, Audiohighway

The price has since fallen, along with the price of just about everything Nasdaq-related, but webMethods still represents a financial triumph—at least until Wall Street takes another tumble.

So how did President and CEO Merrick and his 275 employees, all paper-based millionaires post-IPO, celebrate? The heady festivities included clearing out cubes at the company’s new headquarters to host a modest, catered party for employees and their families as well as Merrick springing for vanity plates bearing the company’s stock symbol, WEBM, for his 5-year-old Honda Accord.

Hang on a dotcom second. If you believe all the hype, this kind of moderation isn’t part of the post-IPO era. Among other benefits, a high-flying IPO is supposed to yield instant wealth, showering everyone from top-ranked management to the lowest-level employee with enough options to buy new vacation homes or fancy cars, and maybe even allow them to retire early or fund their own internet startup. The American dream of the digital age may be coming true for a growing number of high-tech workers, but the truth is that most post-IPO companies, even the stars like webMethods, are far from a cushy sanctum for the rich and famous. Rather, with the added scrutiny of Wall Street and investors on financial performance each quarter, post-IPO life is often the same frenetic, nose-to-the-

grindstone environment that it was before going public. And post-IPO, there’s more pressure than ever on top management—from the CEO to the CIO—to foster a culture that keeps employees focused on the com-



pany’s long-term strategic goals and vision instead of the short-term impact of stock price fluctuations on individual portfolios. “The tone has to be set by the executive staff that this isn’t important—that you’re working as hard as you were before, if not harder,” notes Ted Schlein, a general partner at Kleiner, Perkins, Caufield & Byers, a venture capital firm in Menlo Park, Calif., that has recently funded such dotcom players as used-car marketplace AutoTrader.com and the web search tool Google. “People think of the IPO as glamorous, but more than anything it’s a milestone—a marketing event in today’s world. It’s up to the executive team to minimize its impact on how the company operates on a daily basis.”

WebMethods’ Merrick is all too aware of

that responsibility. That’s why he’s made it a top priority among his executives, including his technologists, to set the tone for moderation and prepare employees for life as a public company. “I have to make sure that everyone understands we have little control over the stock price on a daily basis, but a lot of control over the long term, and that’s completely tied up in how we execute,” says Merrick. “After the IPO, a companywide e-mail went out listing the top IPOs of all time, and we were on that list. But as someone pointed out, of those 10 companies, eight were currently trading below their first-day closing price.”

The message, Merrick says, is clear: webMethods has no interest in becoming part of that group.

Only time will tell if webMethods will make the cut. More than 50 percent of technology companies trade below their IPO price within two years of going public, according to Alec Ellison, a managing director at Broadview International, a mergers and acquisition investment bank headquartered in Fort Lee, N.J. “The IPO is not an end; it’s a second startup,” Ellison says. “Companies need to continue building the company and organization going forward.” That message carries even greater weight given Wall Street’s recent moodiness.

Obviously, CIOs are instrumental in that mission. With many of the newly public

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companies focused on e-commerce, the post-IPO cash infusion is often used to acquire companies or new technologies that can provide a competitive edge. Technology executives are often one of the principal players helping to decide which companies to acquire or invest in. Access to capital to fund these efforts and deliver on the strategic vision is probably the best news about life post-IPO. WebMethods, for example, raised somewhere on the order of \$165 million, and Merrick says that currency will allow it to make acquisitions that would have been extremely difficult to pull off otherwise.

The cash infusion from an IPO also gives technology leaders the flexibility to outsource operational IT functions and assign internal staffers to projects that will help the company deliver a competitive edge—for example, adding personalization and customization capabilities to an e-commerce site or building a multimillion-dollar, integrated ERP and customer relationship management systems.

Yet along with the good side of post-IPO existence comes the bad. Publicly traded companies—whether they're at the top of their game or struggling to push their stock price back up to IPO levels and above—have to contend with living under the watchful eye of Wall Street, explaining every move and how it relates to the corporate mission. "Everything is public now—we're scrutinized on a daily basis," says Nathan Schulhof, president and CEO of Audiohighway (www.audiohighway.com), a website that delivers free audio, video and entertainment content to consumers. (See "Life Is a Highway, Page 108). "I get 30 calls from brokers a day when the stock price goes down, telling me what we should be doing. But we've gotten a lot of money to make our dreams come true, so I suppose that's the price you pay."

These so-called suggestions from the investment community can be a real distraction to the core IT mission, according to CIOs in several post-IPO companies. Say Wall Street and investors get fixated on auc-

a number of other challenges, including the issue of hiring and retaining talent, especially hard-to-find IT professionals. With the average lock-in period restricting employees from selling stock from anywhere between six months to one year post-IPO, many companies are finding it difficult to retain employees when competitors are promising a fresh run at a better IPO, and an internet fortune appears to be perched on every corner.

"It's tough because a lot of this is relatively unprecedented—to have so much stock holdings among employees and so much of compensation packages tied to that as well," notes Ken Andersen, managing editor of *VentureWire*, a daily e-mail newsletter covering the high-tech and venture capital community published by Technologic Partners in New York City. "You have to stress the importance of when times are good, not to get too caught up in the stock price so that inevitably when times are bad you've created feelings that go beyond the value of the stock."

To do that, company leaders need to foster

"We have to be careful where we leave business plans because even the Xerox repairman owns stock."

—Mark Walsh, CEO, VerticalNet

"The best thing about going public is you get liquidity, which means you can use your stock as a tool to either incentivize employees or acquire companies [or technology]," says Jason McCabe Calacanis, CEO and editor of the *Silicon Alley Reporter*, a New York City-based publication focusing on internet companies.

And, of course, you can't totally ignore the financial aspect. A lot of companies that venture into the public market bring some financial reward to pre-IPO employees, and often for post-IPO hires who've been lucky or smart enough to negotiate reasonable terms on their options. While these employees might not make an instant fortune, many are assured of a reasonable profit.

tion technology, for example, because the stocks of players in that arena are on an upswing. Outside pressure from top management to respond to Wall Street's demands means CIOs need to do due diligence and explore the possibilities even if they later determine the technology isn't a fit for the corporate vision. "It's not like investors or the board of directors force something—it's just the general mentality of when the stock isn't performing to try this or try that," notes Bill Weatherwax, Audiohighway's executive director of product development and engineering.

For companies like Audiohighway that are trading below their IPO stock price (referred to as options underwater), there are

a community spirit, giving employees a feeling of accomplishment and a sense of teamwork that's unconnected to whether the outside world responds positively or negatively to the stock. "If people believe in the mission, and you can make them feel like their contribution is recognized and valued, they're not going to leave," Calacanis says. "Success is defined by the individual—for some, success is having \$100 million in the bank; for others, it's going to a job they love."

If you consider today's high standards, most professionals are in search of a dotcom nirvana that encompasses both.

Here's a look at three companies that have been through an IPO and lived to tell about it.



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Have Money, Will Hire

CYBERIAN OUTPOST If having an undervalued stock price is a cloud, Bob Bowman, president and CEO of e-tailer Cyberian Outpost, knows how to find a silver lining. Since going public in the summer of 1998, Outpost stock, which went out at \$18 a share, climbed to as high as the \$40s during the 1998 holiday season and crashed to around \$5. But rather than deterring Outpost employees, Bowman says the ups and downs have fostered an all-out desire to achieve.

"Our technical group is a competitive bunch," Bowman says. "When the stock is low, they want it higher and they'll kill themselves to get it there. In a funny way, it's a motivator."

With competition fierce in this category from sites like Amazon.com, Buy.com, 800.com and others, Outpost can't afford to take its eye off the ball, even for a minute. That's why Bowman, who came onboard last October, believes it's so important to foster a competitive culture by hiring the right people. Bowman looks for hires who embody two key qualities: integrity and energy. A 50-minute interview will instantly reveal a fit. Says Bowman: "We try to hire people excited about accomplishment, who know that nothing comes easy and who know that you get out of a company what you put into it."

Over the last six months, the Outpost IT group has certainly contributed its share. Outpost, which Bowman admits might have been slightly behind its rivals in technology six months ago, has aggressively pushed forward, adding state-of-the-art e-commerce capabilities such as advanced personalization as well as web-based data warehousing. The latter gives the dotcom the ability to drill into customer buying patterns to deliver a customized shopping experience, serving up special offers based on previous purchases. Outpost has also invested in campaign management and marketing software to target promotions at individual buyers.

Despite the disappointing stock price, having the resources to fund initiatives like these as well as to bring in

experienced talent is the biggest benefit of being public, says Dan Bachman, director of business intelligence, who admits, however, that it isn't always easy to find qualified candidates. "Now we have money to do the things we really know are required to move forward," says Bachman. For example, Outpost has purchased Sagent's data warehouse software and now has over 25 data marts in production

Location Kent, Conn.

No. of employees
More than 200

Nasdaq symbol COOL

Date of IPO Aug. 5, 1998

IPO price \$18

**Stock price as of
press time** \$5

www.outpost.com

mode, helping it analyze various types of customer data. "The software lets us be proactive and react to things quicker," Bachman says. "Not many dotcoms have gotten into [this kind of technology]."

Bachman, who's been at Outpost since February 1998, sees little change in the culture since the pre-IPO days. When he first came to Outpost—fresh off a grueling database marketing post at a newly public catalog company where the stock never took off—Bachman was struck by the aggressiveness, yet strong camaraderie among employees. "I saw a young, bright

group of people, not heavy on business experience, but who were very aggressive and willing to try things out," says the 50-year-old Bachman, who adds that he's the old one in the crew. "There wasn't politics, there wasn't a set way to do things, it was a team-oriented atmosphere."

Even with its depressed stock, Bachman says that team spirit is still very much alive. There are no official offices, and people keep shuffling around as the company continues to outgrow its space. While it's not uncommon for employees to work weekends, Bachman says the demands are not onerous, and often, the extra-curricular work hours are fun. For the Super Bowl, for example, Outpost functioned as the back-end order processing site for Computer.com, which bought ad time, and over 100 employees volunteered to help answer the phones, including CEO Bowman. "We ended up having a party and quite a good time," Bachman says.

It's this kind of atmosphere that has made Bachman enjoy going to work again. And he's confident that all the hard work will eventually be reflected in Outpost's stock price, showering him and his peers with the financial return they feel they deserve. Says Bachman: "Everyone has the same goal—we enjoy what we're doing, we have a lot of opportunity building the business, and the ultimate goal will be to pull it off so that the stock goes up and everyone makes out."

To Cyberian Outpost's Dan Bachman, IPO cash means the opportunity to buy better technology.



Silicon Valley, Philly-Style

VERTICALNET What do you get when you cross a collection of the most unglamorous, industrial websites with an all-American Philadelphia suburb? One of the hottest internet IPO success stories that's been able to stay grounded despite its phenomenal growth.

VerticalNet owns 55 (and growing) web-based trading communities, from SurfaceFinishing.com to SolidWaste.com, each delivering specialized content and business-to-business e-commerce services to partners in a particular vertical segment. The firm went public in February 1999 at \$16 a share. Shortly before Wall Street hit the skids, it was trading in the

vicinity of \$148 after a stock split. The 150 or so employees at the time of the IPO were all millionaires—at least on paper—and most of the 1,000 people currently employed in the Horsham, Pa., upstart can expect a more-than-healthy return on their options even now, with the stock trading at a respectable \$51. Yet it's the seemingly mundane nature of what VerticalNet does and the shield of its geography that's helped CEO Mark Walsh and his team keep the company driving toward its mission to be a key global player in the burgeoning business-to-business

marketplace without getting completely sidetracked by Wall Street.

"Being unsexy helped us," says Walsh. "And given that we're not in Silicon Valley or Silicon Alley where there's a plethora of dotcom startups and options envy, there's not the same potential of losing focus."

The challenge of keeping a post-IPO company fixed on its long-term business goals in spite of the distractions of Wall Street, the media and the competition is a common refrain among the leaders of publicly traded dotcoms. And VerticalNet appears to be

right on course. Using its war chest of \$65 million raised during its IPO, combined with other venture capital money and a \$100 million cash infusion from Microsoft, the company has embarked on an acquisition binge that Walsh says will yield \$1 billion in revenues and put it in the black in 2000, up from the \$20.7 million in sales inked in 1999 with no profit. "Having

Location Horsham, Pa.

No. of employees around 1,000

Nasdaq symbol VERT

Date of IPO Feb. 10, 1999

IPO price \$16

Stock price as of press time \$51

www.verticalnet.com

money is one of the key differentiators of business-to-business websites," notes Walsh. "You have to have cash available to pay for what it takes to grow quickly."

So far, VerticalNet has used its reserves to buy numerous vertical communities, including NECX Global Electronics Exchange, a marketplace for the electronics industry, as well as technology companies like Tradeum, a San Francisco maker of a Java-based platform for building online marketplaces. And with all the media hype surrounding its success, VerticalNet is constantly inundated with new business proposals from startups looking to strike that next deal.

Screening the deals often falls into the lap of Dean Sivley, VerticalNet's senior vice president of product development and e-commerce. He says the ever-increasing volume of calls from potential partners—now up to five or six a day—has definitely hampered his ability to keep focused. "When you're pre-IPO, you're totally intent on what you're trying to do—there's not a lot of room for other things," he explains. "Now, it's a challenge to keep up with checking all this stuff out and trying to sort through what's important."

Other issues resulting from VerticalNet's rapid-fire growth are how to prioritize and



Mark Walsh (left) and Dean Sivley of VerticalNet have ridden the stock wave and learned that rapid growth can bring big challenges.

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manage IT projects, Sivley says. To help introduce process into the IT organization the company brought in Microsoft's Solutions Framework. "People were hurting being here until midnight every night and on weekends," he explains. With no formal release schedules and a set of constantly changing requirements, the development process has been slightly chaotic both before and after the IPO, Sivley says. The Microsoft software helped to rein it in by providing

structure and process. Some of the core projects Sivley's teams are pursuing are storefronts, e-commerce centers as well as lead generation and lead management tools.

It's this ability to invest in what it takes to get the job done that Walsh insists is the best part of being public. What's the worst part? "The unbelievable attention on short-term goals," he says. "I have to make sure that everyone understands that VerticalNet gets a new report card every 90 days [when

quarterly reports come out]. There's no equity on past report cards."

There's also the incredible attention now that VerticalNet is the hottest thing going in Horsham. "We have to be careful what we say, even to each other. We have to be careful where we leave business plans because even the Xerox repairman owns stock," Walsh says. "We used to be just a scrappy upstart, now we have to walk, dress and behave the part."

Life Is a Highway

AUDIOHIGHWAY There's a story Nathan Schulhof likes to tell Audiohighway employees as a sort of parable about the qualities and values he thinks are critical to succeed in the internet age. As a struggling law student in San Francisco during the '70s, Schulhof frequented a cheap eats called The Haven. For two years, he'd slide his tray over a 3-foot-long stained-glass light, where he'd stop and decide whether to go for half of a tuna sandwich at lunch and have money left over for dinner or do a noontime pig-out and sacrifice the next meal.

Years later, as a thriving entrepreneur, Schulhof went to check out a beach house he'd just purchased in Stinson Beach, Calif. Much to his surprise, he saw the same light as part of the house decor. The owner, who turned out to be the former proprietor of The Haven, sold Schulhof the light, which now serves as the Audiohighway CEO's main source of inspiration. "In the worst of times, I look at it and I know that if the vision is right, you can persevere—you just have to stay on it," says Schulhof.

As the head of a public dotcom that's currently trading below its IPO stock price, Schulhof has certainly put that philosophy to the test. Audiohighway, a 6-year-old company, now entirely web-based, offers free audio, video and entertainment content to consumers as well as other services such as news and voice mail. The company, which was started with \$7 million in seed funds that Schulhof raised from 150 friends and family members, went public in December 1998, months after an initial IPO slated for August the same year was scrapped mid-

roadshow because of a huge stock market slide. Audiohighway's stock went out at \$6.50 a share, was as high as \$38 around the first quarter of last year, and now has fallen to \$3.

With most of his employees' options underwater, Schulhof and his executive team face the tough job of pushing forward with

way's CFO. "What we're finding is a double-edged sword—with the stock low, there's tremendous room for growth, but it's easy for other companies to pick off employees because there's not a lot holding people here other than their job and wanting to work in a particular segment of the industry."

Recruiting IT professionals is particularly tough. "When our staff sees people all around with more valuable options, they start thinking, 'Why am I working Saturdays, why am I doing this?'" says Bill Weatherwax, executive director of product development and engineering, who joined Audiohighway this January. Weatherwax, who left another internet startup shortly before it went public, uses his own situation as part of the sales pitch. With the stock price under or hovering around where it was at the IPO, Weatherwax plays up the opportunity to join a public company at a place that's almost like being there on Day 1.

On a personal level, being a technology manager in a post-IPO firm lets Weatherwax tackle more strategic issues like team building, keeping projects on track and creating a technology culture instead of the down-and-dirty programming role IT plays in pre-IPO days when the primary goal is getting product out the door. With technology at the center of most projects, Weatherwax admits to feeling stretched at times. "I'm constantly being brought in to provide technical perspective on ideas, which can take you away from your core focus—which for

Location Cupertino, Calif.

No. of employees around 80

Nasdaq symbol AHWY

Date of IPO Dec. 17, 1998

IPO price \$6.50

Stock price as of press time \$3

www.audiohighway.com

the company's vision—to be a global entertainment site—while keeping employees motivated and challenged. "Managing expectations of our workforce and attracting and maintaining employees is the key thing on our plate," says Greg Sutyak, Audiohigh-

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Audiohighway's Nathan Schulhof tries to keep employees motivated despite a depressed stock price.

us now is an e-commerce redesign," he says.

Culture is critical at Audiohighway, and Schulhof is a big fan of team building, job development and perks to keep employees happy and sheltered from the ups and downs of Wall Street. Schulhof has regular meetings with employees, pays competitive

salaries and full health care for entire families and sponsors regular community events like Team Building night. The last one was held in March 2000, when the company took over Emile's restaurant in San Jose, Calif., for cooking lessons and dinner with its chef.

Yet Schulhof has been around long enough to know that even the best benefits can't completely make up for Audiohighway's sagging stock price. "Sure, the

stock price pisses me off, but I don't focus on it," he says. "I know in my heart that if we stick to the company's goals and get the projected results, the stock will take care of itself. I'm a pit bull, and I won't give up until we finish the job." **CIO**

Had an interesting post-IPO experience? Let Senior Writer Meg Mitchell know at mmitchell@cio.com. Freelance writer Beth Stackpole can be reached at bstack@stackpolepartners.com.

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emancipation proclamation

The authors of *Net Slaves* pay tribute to the unheralded victims of the dotcom revolution

BY MEG MITCHELL

It all started with two guys, an idea and a website. When Bill Lessard, 34, and Steve Baldwin, 43, were working together at Time Warner's Pathfinder in 1996 (Baldwin was a technology editor and Lessard was a communications producer), they found out why the technology industry didn't sit right with them: long hours, high stress, zillions of dollars disappearing into doomed projects and an unbelievable amount of hype that most people bought into.

After enduring job after job in the underbelly of the technology industry—Lessard tore through seven in as many years working at what he calls “some of the most fabulous disasters in the history of the internet,” and Baldwin bounced around the world of technology publishing enough times to leave bruises—the two decided to get together and write about what they'd witnessed. To get fodder for the manuscript, they started www.netsslaves.com, a site where others could share their stories. “We wanted to gather enough facts to see if we were the only two losers in the world,” says Baldwin. Good news: They weren't.





PHOTOGRAPHY BY STEVEN VOTE

**Bill Lessard (left) and
Steve Baldwin**

And *Net Slaves: True Tales of Working the Web* (McGraw-Hill, 1999), which emerged after the website started attracting attention, is full of those stories—tales that are engaging, hilarious and tinged with despair. (Names have been changed to protect the innocent and the less-than-innocent, but one doesn't have to think too hard to identify the guy with the "standard geek-issue, bowl-shaped cut" who just happens to be the head of a leading software company in Bellevue, Wash.) There's Jane, a freelance HTML coder who's blamed when faulty software announces that O.J. Simpson has been declared guilty after the criminal trial jury finds him innocent. There's Officer Kilmartin, who trolls the chat rooms and bulletin boards of a popular online service to make sure illicit material doesn't sully its family-friendly image. There's Boyd, who leaves his job in a porn shop to take a hellish help-desk position that makes his former occupation look like a stay at the Ritz-Carlton. None of these characters strikes it rich; many of them barely make a living. And they have one thing in common: They are members of the class of net slaves, the stage hands who labor long after the internet stars have gone home.

Lessard and Baldwin divide the net slaves into categories, such as garbagemen (quality software engineers), social workers (bulletin board discussion leaders) and cab drivers (freelance HTML programmers). With each category comes a list of characteristics: fry cooks, who sweat it out in the startup kitchens and enjoy literature "written by an angry loner on the verge of cracking up"; cyber cops, who live at home with their parents; and their nemeses, the street walkers, who are all about to close on waterfront condos. The higher up the caste system you go, the fewer members there are. While garbagemen comprise 40 percent of the internet population, robber barons (self-explanatory, that one) make up 0.1 percent.

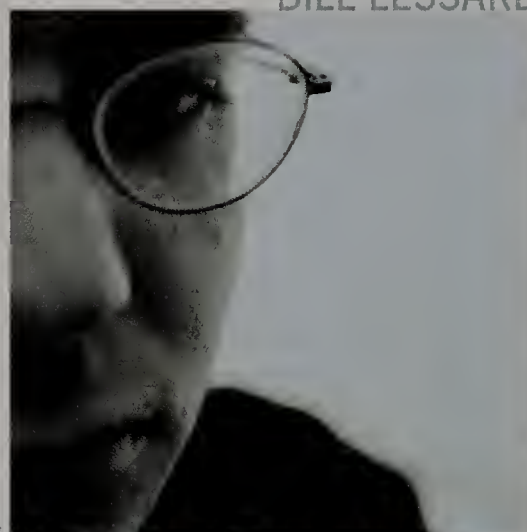
But while the stories are entertaining, the message they convey is grim: Somewhere along the line, things went wrong with this internet economy. *CIO* talked to the authors of *Net Slaves* to find out why.

CIO: Why did you decide to stop working in the technology industry and start writing about it?

Lessard: Do you know what the definition of insanity is? It's doing the same thing over and over again and expecting different results. A lot of people who criticized us and the book have called us whiners. They say, "Why don't you just go get another job?" Well, we've done that over and over again. But the problem is that no matter where you go, companies are struggling. What we tried to do with the book is demythologize the entire industry and bring to the forefront the people who are really doing the work. We got tired of going to parties where people would say, "What do you do?" and then expect \$30 million to fall out of your pocket if you said, "I'm in the technology industry."

We got the idea for the book, we interviewed some people, we sent it out, and none of the publishers were interested: It was too negative, it was too nichey, who cares about a bunch of geeks, blah blah blah. So, just short of jumping off a bridge with cables around our necks, we put up the website and it took off.

BILL LESSARD



“WE GOT TIRED OF GOING TO PARTIES WHERE PEOPLE would say, ‘What do you do?’ and then expect \$30 MILLION TO FALL OUT OF YOUR POCKET if you said, ‘I’m in the technology industry.’”

You tell some pretty sobering stories of net slavery. Why is this all happening?

Lessard: There's a lot of money at stake. It's a gold rush mentality—people are very greedy and ethically challenged, and a lot of abuses have come out of it. We've kind of turned entrepreneurship into rock and roll. It's like CNBC is the MTV of the internet generation, and by extension, the CEO is the rock star. If this were the '60s or the '70s you'd have a bunch of people in a house saying, "Hey man, let's form a rock band, put out an album and make a million dollars." Now

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it's a bunch of people in California who say, "Hey man, let's get together, form an internet company, go public and make a billion dollars."

The technology industry can't be all bad, can it? What are some of the good aspects?

Baldwin: One of the things I really loved was how positive everyone was about [the industry]. Whether or not the product they were behind ever made them rich, everyone really believed in the possibilities of this environment. It was tremendously exciting, and it still is, but I think one of the costs of this is that if you start to complain or if you say, "Why did I work 18 hours a day on a project that went belly up?"—if you start addressing the facts of work life—very quickly you're considered a non-team player, and you have to really conceal that from the world. It's not really mind control, but everyone is so positive that there's a denial of the rough edges of this industry. And there are many rough edges.

STEVE BALDWIN



“THESE YOUNG CODE JOCKS KNOW THE CODE REAL well, but there's more to the world than just the CODE. THIS IS RUNNING A COMPANY. IT'S NOT A GAME.”

Was your objective in writing the book to make the enslavers or the enslaved take notice?

Lessard: I'd say that it's both. On one hand, we want people in this industry to feel that they're not alone. In the past year or so since we've had the site up we've gotten e-mail from all over the world. One of the most poignant said, "Until I saw your site, I felt like I was the only one in the horror movie that had seen the alien."

Baldwin: The idea was to try to create a sense of solidarity or non-aloneness among people who find themselves in similar circumstances. That's something we seem to have struck a resonant chord with on the website and in the book.

But some people really are succeeding in this internet economy. What do they say?

Baldwin: People say, "You guys are missing the boat! I've got a new airplane! I've got three new girlfriends! I've got everything. And if you're not like me, you're a loser." They might be on top of the world right now, but where will they be when they are 30 years old? There's a lot of evidence to suggest that being a rock star Java guru or a C++ programmer is a young person's game, and you don't have a really long career life. If you're 22 or 27 you don't mind working 80 or 90 hours a week. Maybe it doesn't matter if you drop off the map. But once you get to be 30 or 31, you

want to settle down, you want to have a family, you've picked up some obligations. Are you still willing to work the 80 or 100 hours a week? And will they still want you?

Whose fault is all this?

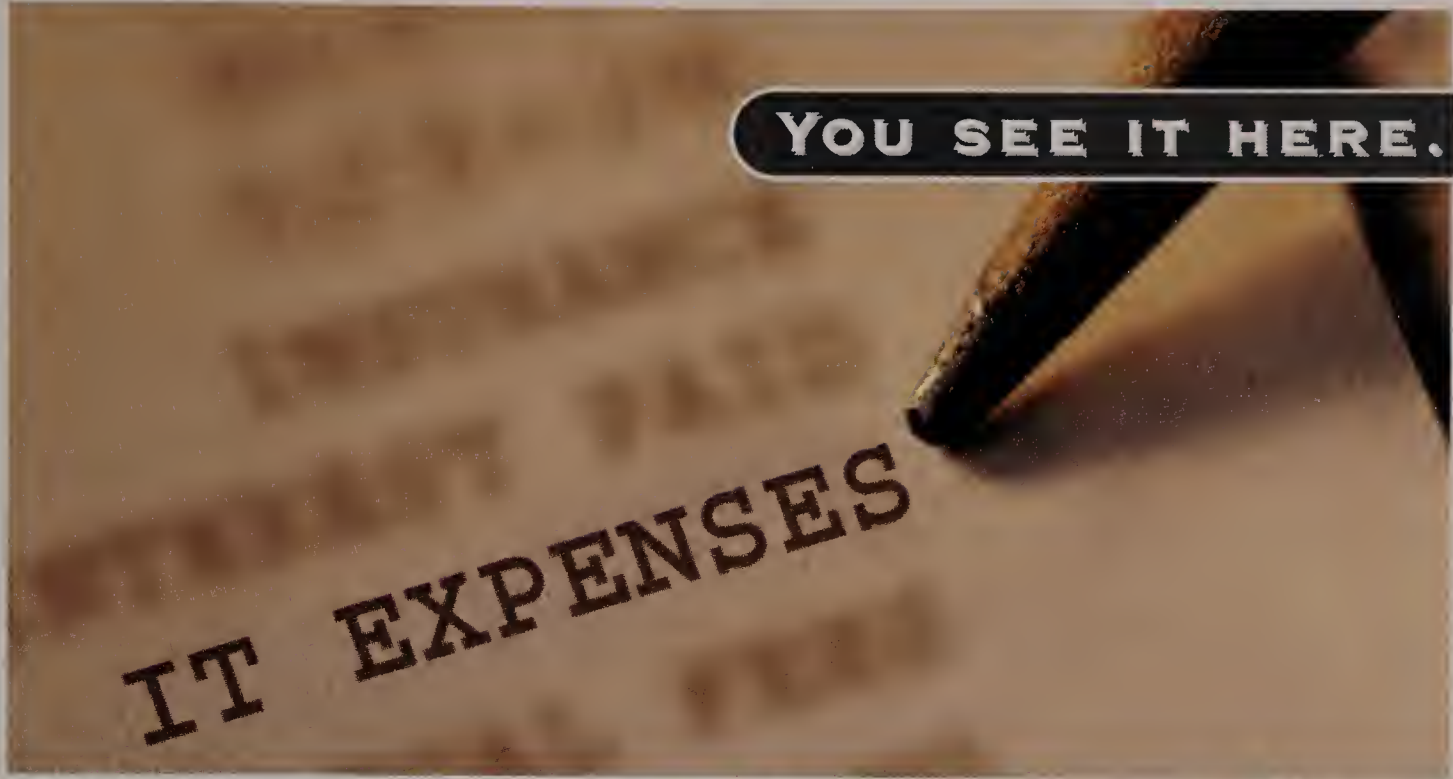
Lessard: We don't want to say it's management's fault, or that it's the venture capitalists' fault. People make conscious decisions. Nobody is holding a gun to their heads and forcing them to be in this industry. But if someone mistreats [these workers], they should not be passive about it, they should fight back.

Baldwin: It's also important to arm yourself with information and do your homework ahead of time. The net provides a lot of resources. That's the other side of it

being a small business. Companies, too, have reputations. But companies are also very squirrely. It's sometimes difficult to find out what a workplace culture is really like. I would definitely go in and inspect the place. Look at the programmers. Look at the environment. Do your homework.

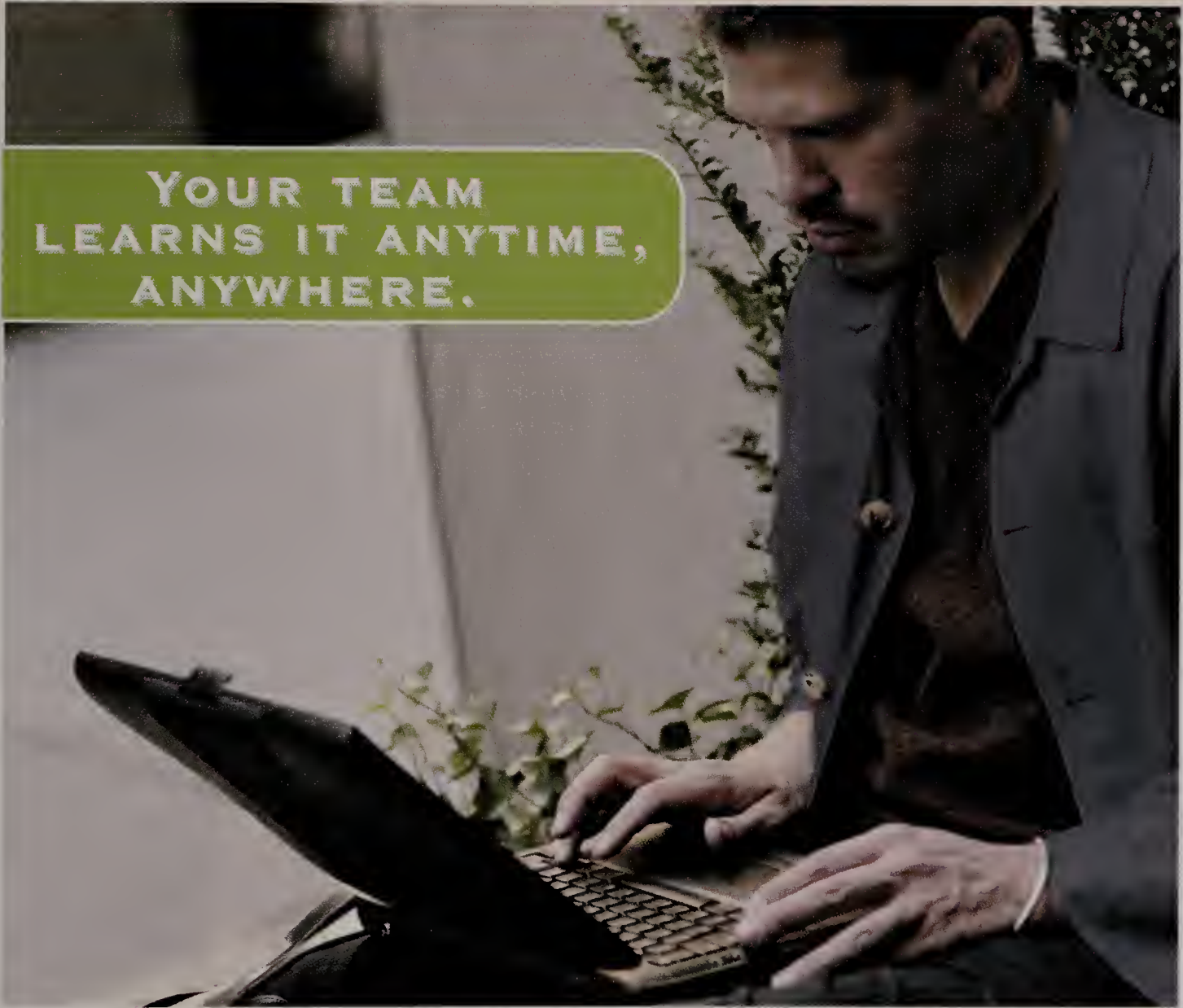
Is it possible to work in this industry and not be a net slave?

Baldwin: It is possible, but I would say it's certainly a challenge to be able to assert the kinds of claims one used to make about rights. It's not like we have a right to a 40-hour workweek. We don't. But people are still people. They all have passions. They still have negative things about them. And they're all expressed in the workplace.



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Lessard: One thing we tried to make clear in the book is that it's not a static caste system. It's dynamic. You can reinvent yourself. You can move up the food chain. So while there are people who are killing themselves, there are others who are doing just fine as consultants or owners of small businesses.

Is net slavery a necessary evil of this economy?

Lessard: No. I have to go back to the mantra that human beings have not changed. People can do only about four or five hours of solid work a day. The reason people work so many hours in the internet industry is because of disorganization. For every bad software release, if they had only slowed things down a little bit, they

younger dotcom companies and managers might immensely benefit from it. And I don't think there's an appreciation of that. You know, it's a young person's business. These young code jocks know the code real well, but there's more to the world than just the code. This is running a company. It's not a game; it's not a virtual environment. There are a lot of lessons they're going to learn the hard way. But people in this business want to make a quick hit, make a billion dollars and get out of there.

What do people from traditional companies need to understand about net slavery?

Lessard: Those people who do have more traditional business values should realize that most internet companies are culturally narrow. If you work in the IT division of a bank or an insurance company, everyone's role is defined. There are definite functions and everybody knows what they're supposed to do. Then if you go to an internet company, nobody knows what everybody does. Everybody has titles like Head Yahoo, Chief Evangelist, Guru; nobody knows what they're supposed to do. And because startups are by definition

wouldn't have to go back and redo it. In this economy, people work longer and stupider.

Baldwin: Part of what makes things inefficient is culture. The traditional way of running an org chart, running this hierarchical top-down approval process—I've seen companies that make the process two or three times longer. I've also seen that at old-media brick-and-mortar companies where they just don't understand how decisions need to be reached for what is essentially an iterative project. It doesn't have to be this way. But it's a very young industry. The railroads had been around for years before there was any credible movement to make them more efficient, safer and unionized. And that ultimately made it difficult for railroads to survive. But for a while it was the only way people working in the industry could lead any kind of normal lives.

How can CIOs emancipate net slaves?

Baldwin: In a certain way, CIOs have much more relevant experience because they've seen the software cycles, fought many of these battles and learned the truth: A human being is a human being. They know what happens to people under pressure. It's a shame that more [CIOs] are not brought in, consulted or listened to because I think they would have a lot to say. If they could codify their wisdom and put it into some organized framework, the

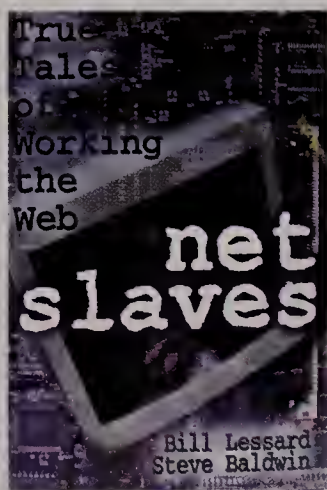
immature organizations, the culture is basically the culture of the two or three people who started the company—in most cases, technologists. But you need different types of personalities in order to make a good company. People should not deny who they are, where they've been, what their experiences are. At the same time, old school technology people should realize that working at internet companies is a lot like making a deal with the devil. Most of what really happens in this industry is underreported by the mainstream media. Companies fail all the time. A lot of companies fail. It's safe to say that one in 10 makes it to the IPO. Yet you have companies that are nailing bunk beds to the cubicles and the developers are sleeping there. And nobody sees anything wrong with that. That's what's really sick. **CIO**

Find Out More...

Hear More From Steve Baldwin and Bill Lessard on CIO Radio starting June 7. Check out www.cio.com/radio.

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Do you have tales of net slavery to share with us? Senior Writer Meg Mitchell wants to hear them at mmitchell@cio.com.



Net Slaves: True Tales of Working the Web
By Bill Lessard and Steve Baldwin
McGraw-Hill, 1999, \$19.95



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built to ~~last~~ move

E-commerce is changing how IT plans and builds systems. Command and control are out; flexibility and collaboration are in.

BY CONSTANTINE VON HOFFMAN

For years, your company has been keeping track of which customers order what products from you. If members of your sales force could get their hands on that information, they'd be able to spot customer preferences and know which new products to recommend. If your design team staffers had that information, they could take customer preferences into account when creat-

ing new products. To really capitalize on this opportunity, both the sales force and design teams have to keep each other up-to-date on what's wanted and what's in the pipeline.

Reader ROI

- ▶ Learn how the internet is changing traditional IT departments
- ▶ Discover how the role of enterprise architect is evolving

ILLUSTRATIONS BY LINDA HELTON

There's a problem with this scenario, however. The IT group and web departments are both charged with coming up with ways to do this, and neither side is offering an approach that fits the bill.

IT first has to figure out which applications to deploy and then train everyone to use them; even then people will only be able to access information from specific, prop-

erly connected company offices. However, the information will always be correct and totally secure from probing by anyone outside the company. On the other hand, this approach presents your company with high training costs, a long implementation schedule and a real hurdle in getting the information into the field.

For its part, the web group says it can cre-

At health-care network Yale-New Haven Health Systems in New Haven, Conn., moving the IT department to a web mind-set has meant more than migrating from mainframes and LANs to the web. It has also meant going from a situation in which the IT department determined what was best for everyone to one in which the department has to share the decision-making power.

“Being in SAN JOSE allows my group to FOCUS on getting WEB applications up and running QUICKLY.”

—Brad Lewis, manager, Snap-on internet commerce center

ate an application fast and cheaply while making the information accessible from everywhere. They'll use a web-based front end that will cut down on training costs; anyone with a browser and a password can access and input information. All the web team needs is for the IT department to download the information from a legacy database onto a Unix server every night. This approach, however, creates a problem. The IT department isn't likely to go along because of the risk of creating redundant and out-of-sync databases, which anyone with internet access may be able to get their hands on.

New Tricks

Some companies are solving this architectural dilemma by making their IT departments move on web time. While that's a simple concept, implementing it means changing the way the IT department has been doing business pretty much since its creation.

This shift came to the fore during a recent web project. “We have an old mainframe legacy system that we use as our principal clinical system,” says Mark Andersen, Yale-New Haven's CIO. “It has taken a lot of effort to make that accessible [through the web].” Prior to putting its systems on the web, the mainframe was used only for accessing clinical data—records and test results—from Yale-New Haven's facilities.

Now, the system's 3,300 medical staffers can access clinical and reference information anytime, from anywhere. This means more satisfied physicians, better care for the patients and a savings payoff for Yale-New Haven itself. For example, if a patient has a problem when her primary care physician isn't on duty, the patient receives treatment from a doctor who has never seen her before. Before the web, that doctor may have called the primary care physician and described the situation and patient's history over the phone. Now the primary care physician can look at the patient's records from home, access an internal reference library and then make treatment recommendations online. For the organization, bills are now processed faster because records of services rendered



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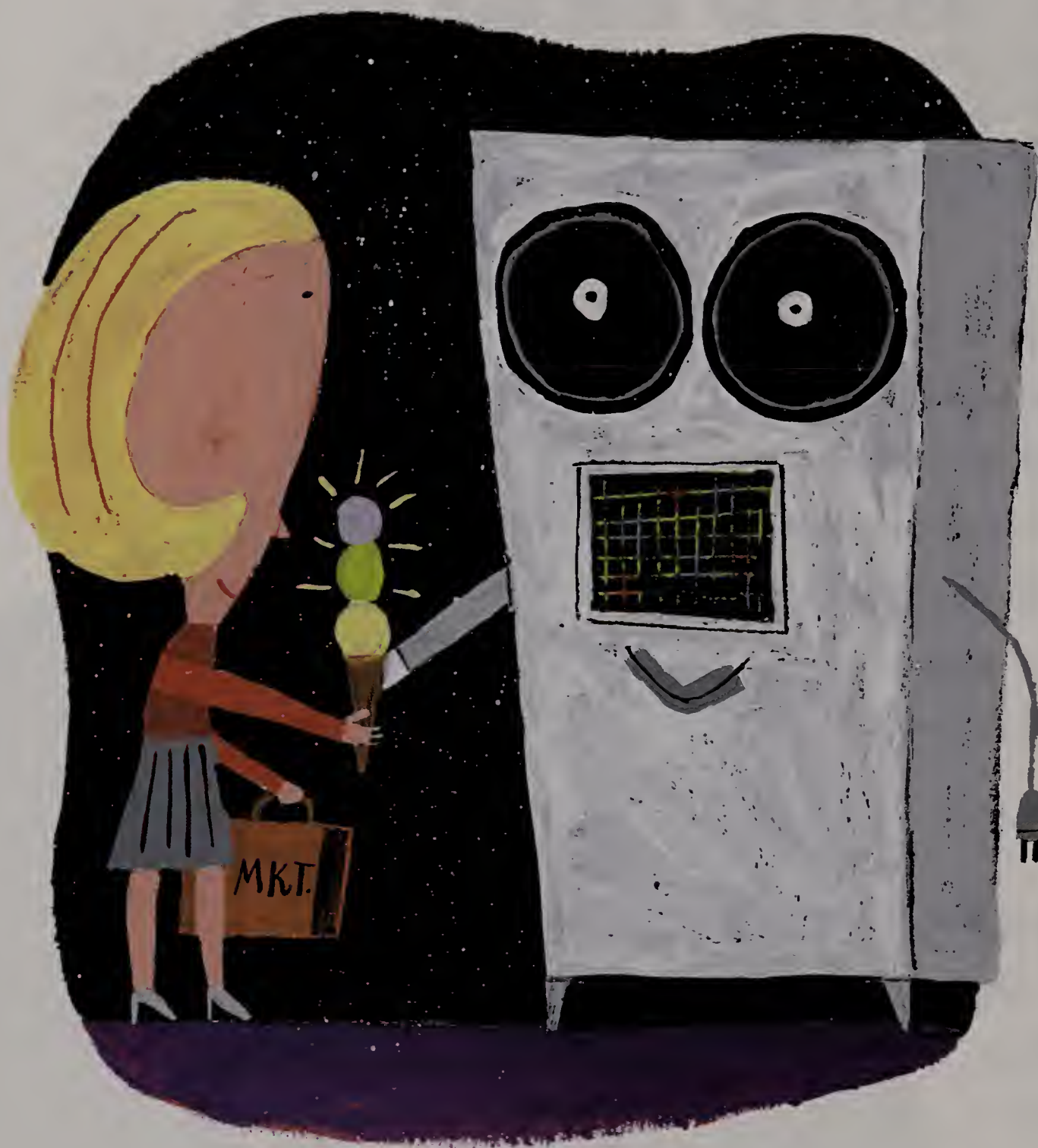
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Both IT and the WEB sides are
LEARNING to get along with each other
in many ORGANIZATIONS, often
because of SHEER necessity.

are available to all departments as soon as they are entered into the system.

In technical terms, making this transition first involved installing remote dial-up access and then using a suite of programs from Citrix that integrates interactive applications

into a standard web browser, combining personalized web content with managed applications. These programs also allow Yale-New Haven's IT department to manage applications from the mainframe.

Andersen also coordinated an initiative

being run by the hospital's marketing group for external customers. This has added a health-care library, an online referral and appointment service as well as a subscriber e-mail newsletter to Yale-New Haven's website. Even though the IT group keeps the site up and running, it no longer dictates how things operate. Marketing is responsible for the site's content, yet neither IT nor marketing can change the site without agreement and cooperation from the other.

That's a big change for IT managers like Andersen who are used to having sole control of an organization's computing needs and IT architecture. As the final arbiters on all things technical, the IT managers used to pick the applications that were deployed and made sure the users were trained on them. That's not how it works now with the web, Andersen observes. At Yale-New Haven, IT has had to follow the lead of the marketing group in terms of what's needed on the web. Yet IT enables the website by providing content from legacy systems. As a result, Andersen's department has more influence on the kinds of applications that are offered online.

Andersen isn't alone in playing catch-up to the web development group.

Yet both IT and the web sides are learning to get along with each other in many organizations. This newfound cooperation is often because of sheer necessity. Both are being hit with the need to justify their costs. "There are a lot of pressures on these folks right now. They're short of people, and they're under tremendous pressure to perform and provide valuable service to the business to justify their existence," says Fred Meyer, vice president of product management for Tibco Software, a provider of real-time infrastructure software based in Palo Alto, Calif. Many IT organizations have responded by becoming more aggressive about business-oriented goals, says

Meyer. And this has meant IT has to work much more closely with the web side.

Andersen says he has been fortunate in that he and Yale-New Haven's head of marketing get along very well. "Our relationship between the MIS and the marketing groups is one of the better ones I've ever seen," says Andersen. "They want to get stuff out there, and we want to make sure we know how to support it."

internally and presents them with new challenges that they might not have faced from the traditional infrastructure." And, in addition to not getting the funds and limelight, IT groups are also kept out of the loop, being treated like the proverbial mushroom—kept in the dark and fed, well, a component of fertilizer. "IT is, in many cases, the last to know what's going on, what's being developed, what type of

do one of three things: create an entirely separate web company—as when KBToys spun off KBKids.com; outsource web functions to a third party; or establish an entirely new unit within the company. Unfortunately, none of these approaches guarantees success. The separate company may flounder, the third-party provider may not understand the core business processes and the internal unit may face serious oppo-



Inferiority Complex

Most CIOs don't have it as good as Andersen, though. Friction between web and IT groups is more common than not, often as a result of IT jealousy of all the organizational attention and funding devoted to the web group, says Stephen Elliot, an analyst with Gartner. "You would be hard-pressed to find anyone in IT who wouldn't want to work on an internet strategy or anything related to the internet," Elliot says. "[Working on web initiatives] helps them hone their skills, gives them better prestige

FRICION between WEB and IT groups is more COMMON than not.

impact it's going to have on the existing infrastructure," says Elliot.

Another reason IT personnel are envious of their web group coworkers is that many web groups started out as part of the IT department. When senior managers realize that the cultures and skills needed for a web group are, in fact, very distinct from those being used by IT, they usually then

sition from within the company.

"If an organization is created and still remains within the company, many times that's not as effective as intended because it tends to alienate a lot of the other pieces of the IT organization that are not connected with that," says Kevin Mulcahy of DMR Consulting, a provider of management consulting and IT services in Edison, N.J.

Separate but Equal

Snap-on Tools has avoided this pitfall. The IT department for the Kenosha, Wis.-based manufacturer of auto industry tools was initially given the assignment of putting transactions on the web. "Our initial e-commerce initiative was focused on our dealers," says Brad Lewis, manager of Snap-on's internet commerce center. The goal was to migrate the 3,500 dealers in the United States away from faxing and calling in orders to submitting them electronically twice a week.

Snap-on launched the initial project in 1994, although it took two years for a majority of dealers to use it on a regular basis. Snap-on's senior managers then decided they could realize even greater efficiencies through the web. To get that done, they created a separate web unit in San Jose, Calif., far away from the corporate headquarters. "[Being in San Jose] allows my

master builder

The job of enterprise architect isn't going away, but it is changing

With the web pressing IT to deploy applications at a fever pitch, are there any enterprisewide architects anymore who sit down and try to figure out what a company's needs will be in five or 10 years?

Since technology changes so quickly, it's impossible to predict what anything is going to look like even just a couple of years down the road. The only constants seem to be that companies are going to need more storage and more servers, but as far as what will be stored or what those servers will be running, no one is willing to hazard a guess.

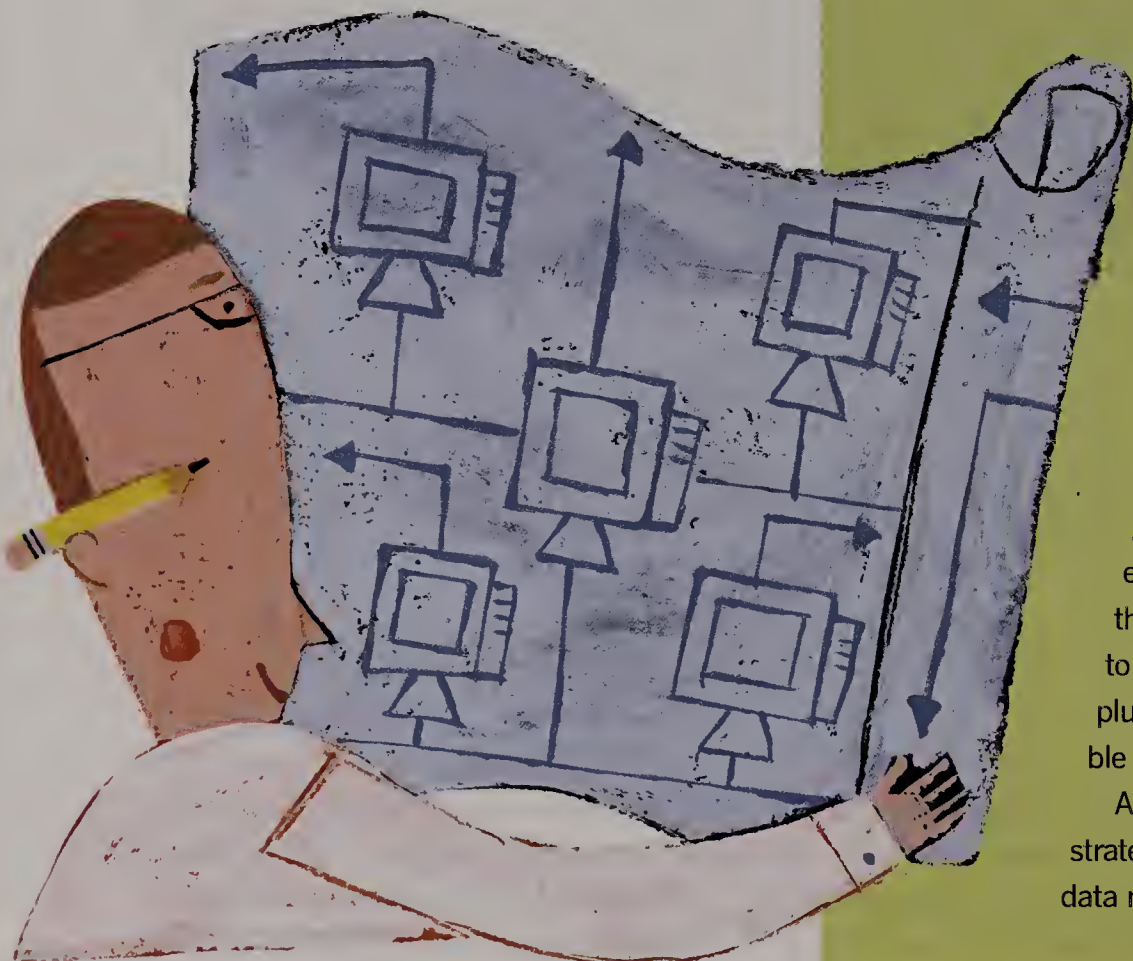
When it comes to reading tea leaves, the architect's responsibilities have changed. Yet the job of assessing enterprise architecture is more important than ever. Many companies have relegated the role of architect to choosing what applications and processes work best to the lowest level possible. Senior management has realized that it no longer makes sense for corporate headquarters to dictate to the area office in Timbuktu whether to use Microsoft Excel or Lotus 1-2-3. The only thing that matters is that all the different offices be able to read and use each locale's data. And that's where the enterprisewide architect comes in.

"A lot of organizations have given up on having centralized planning," says Fred Meyer, vice president of product management at Tibco Software. "They've still got a centralized planning group but [it] mediates between all the local architects." Instead of dictating what kind of architecture is used locally, the planning group sets service levels and security measures on an enterprise level and advises local groups on how to connect to the corporate infrastructure.

In this respect, the IT architect resembles a city planner. He or she is responsible for making sure the gas, telephone and power lines are all in place and that everyone follows the same standards when constructing their buildings, so that someone moving from one house to another doesn't have to outfit their appliances with new plugs. And, like a city planner, IT architects aren't responsible for what every building looks like.

As a result, the planner now has to have a much more strategic view of what the company is trying to do and what data needs to be shared in order to accomplish its objectives.

—C. von Hoffman



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group to truly focus on getting web applications for e-commerce and websites up and running quickly and efficiently," says Lewis. "It kind of took us out of the typical corporate IT environment and put us smack dab in the middle of Silicon Valley."

Despite being thousands of miles away from the IT department, the e-commerce group is still highly dependent on it. Thanks to the efforts of the IT department and the e-commerce group to integrate an online

everything from net meetings to videoconferencing to online project management in order to stay in regular contact with his counterpart in the IT department. He is not surprised that it has taken so much work for him to get the message across. "We're talking about a change in philosophy," he says.

In the Same Boat

It's helped that Lewis has been able to show the IT

way street, Snap-on's Lewis has one person from his 16-member department working at the IT offices in Kenosha. His job is to translate each group's concerns to the other. "He's on my team but—while his job is to interface with this group so that they understand your needs and your problems—he's kind of riding the fence: Some days it looks

**"Most of the FACTS or hard data
that are going to be NEEDED by
the E-COMMERCE system are already
in the SYSTEMS that exist."**

—Larry Warnock, VP of marketing, OnLink Technologies

catalog system with Snap-on's current ERP system, the company now runs a website that personalizes its product catalog for each customer. It adjusts the selection of tools and prices depending on which industry the customer is in and what, if any, pricing agreements the customer has with Snap-on. All of this requires a lot of information from the IT department—everything from when the latest tools are due for release to new pricing guidelines. In addition, some updates to the website no longer need to go through IT. For example, an employee in the industrial division can add a new customer to the system by filling out an online form with the customer's name, password and ID number.

Getting this up and running was a very frustrating experience for Lewis, who recognizes that he was asking IT to break some old habits. To keep his objectives on the radar back in Wisconsin, Lewis has used every web tool possible to shrink the physical distance between the two groups—using

department what he wants to do and how it will help the company. "I believe in proof of concept. So I figure out a way to get it done, and I show it to them and say, 'Look at this; isn't this neat?'"

In turn, one thing that has made life easier for Snap-on's IT department is that Lewis and the e-commerce group understand how much of the content they need is contained in legacy databases. Such an understanding can help the web group and IT department get along at other companies.

"Most of the facts or hard data that are going to be needed by the e-commerce system are already in the systems that exist," says Larry Warnock, vice president of marketing for OnLink Technologies, a Redwood City, Calif., provider of sales and marketing applications for e-commerce. "So if [the web group] just looks at the systems they have—as sort of a great source of data—it can coexist."

Realizing that communication is a two-



like he works for them and some days it looks like he works for me."

A similar mind-shift needs to happen at organizations to bridge the gap between IT and web architecture.

"Once you get done looking at your horoscope and your stock quotes, if the infrastructure isn't tightly tied to the website then you don't really have anything to say," says Meyer. "That us-versus-them, we're-building-the-website and you-guys-go-away-and-do-the-infrastructure thing that was common a couple of years ago is really off the map now." **CIO**

Is your IT group built to move? E-mail Senior Editor Megan Santosus at santosus@cio.com. Constantine von Hoffman is a Boston-based freelance writer.

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Free to Be

Tim Wright knows acquisitions. As the head of technology at CD-ROM publisher SoftKey (which later became The Learning Co.), he helped oversee more than 20 of them. Wright was also a central observer when toy maker Mattel made its ill-fated purchase of The Learning Co., which was completed in May 1999. Wright's short stint at Mattel proved very practical; it taught him how not to handle an acquisition.

"I learned that above all else, you don't impose tight constraints from above, that you treat the staff you've acquired with re-

spect and you keep the products shipping," he says. After several months at Mattel, Wright, a certified scuba diver and former mathematics lecturer at the University of West Indies in Lon-

Reader ROI

- Discover why acquiring internet-based companies requires kid gloves
- Learn how to spot technical red flags before an acquisition

For Lycos, the best way to integrate new companies under its corporate umbrella is to help them remain autonomous

BY STEWART DECK

don, began to look for other challenges.

In November 1999, he found one when web portal network hub Lycos came calling. The fast-growing company based in Waltham, Mass., was searching for its first CIO. "They were looking for someone with experience in acquisitions, someone who knew how to handle multiple staffs of skilled people and knew how to blend disparate pieces together," he says.

When it comes to acquisitions, some companies search for products, technologies and services that complement their current product line; the end result is that the acquired companies are swallowed whole. Networking equipment giant Cisco Systems often brings its acquisitions on board this way, blending them in completely and centralizing all operations. "It's hard to argue with the results Cisco gets,"

PHOTOGRAPHY BY FURNALD/GRAY



**For Lycos CIO Tim Wright,
giving acquisitions free rein
is the way to go.**

Mergers & Acquisitions

says Jonathan Poe, vice president and analyst in Stamford, Conn.-based Meta Group's executive directions program. "Their successes [in acquisitions] speak volumes," says Poe. This strategy is a particularly good one for Cisco because the company can integrate new offerings into its existing product line in an effort to provide customers with a broad set of tools. The skilled engineers Cisco acquires can continue to develop and advance the company's products even as they are added to the Cisco catalog.

The Power of Confederation

But as Lycos demonstrates, there's another way to go about the acquisition game. While Lycos is quick to centralize back-office operations such as human resources, payroll and accounting, the company goes to great lengths to allow its acquisitions to maintain their individual identities. Lycos is discovering that letting acquisitions live on works well, especially in the dotcom world where there are more independent-minded entrepreneurs than profits.

"In managing an acquisition, you're really looking for the sweet spot between centralization and complete autonomy," Poe says, adding that too much centralization can strangle an acquired company and cause an exodus among the creative people who've just been brought in. And in the dotcom world, where creativity is the currency on which websites live or die, losing top-quality, smart people can irretrievably harm a company's long-term prospects.

Lycos' strategy is to keep its acquisitions of internet-based companies in a loose confederation. This tactic is designed to keep the smaller companies nimble—and to keep the employees at those companies from jumping to greener, less restrictive pastures. For example, Gamesville.com, a gaming and entertainment site Lycos purchased in November 1999 for \$207 million, has continued to roll out timely new games, including college and professional basketball tournament contests that might have been held up completely if the company had been forced to meet several layers of bureaucratic approval. And instead of being threatened by the success of its acquisition,

HotBot, Lycos allowed the search site to maintain its autonomy from the main Lycos search directory. By doing so, Lycos and HotBot are both among the web's top 10 search engines and together draw more visitors than a merger of the two would have.

At Lycos, it's Wright's job to weave the corporate technology pattern around acquisitions, to discover how best to use technology and the human and network resources to support the autonomous confederation of high-traffic websites Lycos has acquired.

Laying the Groundwork

When Lycos makes an acquisition, it does more than just sign an agreement. Wright wants to ensure that the acquired company keeps operating normally. "I talk to the company and make sure it understands we want it to run business as usual. I don't want to scare anyone, so I try to make [the employees] feel at home," he says. Doing so will begin to help assuage fears of customers and even employees who may think that everything will change under new ownership. This is particularly critical with internet businesses that derive much of their value from the caliber and size of their audience.

Wright also brings up some of the fringe benefits that come with an association with Lycos. "We let [the acquired companies] know right away that we can help them by redirecting our traffic to their site and recirculating traffic back their way," Wright says. Redirecting traffic can



Before acquiring a company, Lycos wants to make sure cultures fit, says Executive Vice President Ron Sege.

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make a tremendous difference when you're talking about the Lycos network's 82 million average daily page views and 3.5 billion page views per month. By recently funneling and recirculating Lycos network site visitors to its new acquisitions, Lycos easily tripled the traffic on both the Gamesville.com and Quote.com sites, Wright says. This kind of traffic boost pays off handsomely in advertising revenue for the acquired sites.

Wright's soft sell approach doesn't go unnoticed by founders at acquired companies. "The first thing Wright said to us was, 'Keep doing what you're doing, and keep your product moving,'" recalls Stuart Roseman, CTO and cofounder of Gamesville.com.

Roseman has loved being an entrepreneur and enthusiastically says, "There's nothing like the excitement of building something yourself." And yet, the merger with Lycos hasn't dimmed this independent spirit. "How can being part of the fourth-most-visited net-

work in the world be a bad thing?" he asks. "Has the size held us back, kept us from being nimble and responding quickly to challenges, has it somehow changed our entrepreneurial spirit? Not in any way. We're still doing our own thing, and we're still focused on conquering the world. Being part of Lycos will allow us to do that more easily," he asserts.

Personnel Matters

No matter how big a welcome mat Lycos throws out, it's still not easy for other managers at acquired companies to give up control. After all, many have an emotional stake in their companies, having poured themselves into starting something from scratch. Wright is sensitive to the hand-holding that is often required. "What you find with [employees at] many startups is intense loyalty to the application they've built and to the people who are there," says Wright. "You have to be sensitive to that and try to harness the passion and the skills they have. Challenge them with work and responsibility and help them unleash their ideas."

One of the chief challenges in an acquisition is keeping the good people who have just been brought on board. The best way to do this is by giving them professional development incentives, such as added network management responsibilities, additional certification training and clear career paths and goals, things they may not have had at a startup. Competitive pay—not just stock options—will also likely be something they'll appreciate and something they may not have had in a small company.

Another, perhaps even larger issue may be finding a challenge for the founders. "Incentivizing founders can be very difficult," says Wright. "They've just made a snot load of money and now they don't have to work so crazily anymore." While at Lycos, Wright has met founders who subsequently had little to do after being acquired because they were no longer controlling day-to-day operations. In some cases, Lycos has found that it's better to pay mavericks to walk away entirely than to have them stay on and grow frustrated. "In some situations, the sooner you can reach this path of least resistance the better," Wright says.

Another carrot Lycos dangles to acquired companies is removing the burden of administrative tasks. Wright sees to it that all the mundane, everyday worries—including traffic monitoring, router and firewall management, server administration, load balancing, database support and even legal services—are taken off the shoulders of acquired companies, leaving them to concentrate on site development. Doing this allows Lycos to have some administrative oversight of the new sites coming into its network, while gaining some economies of scale with its own suppliers.

But not every acquisition is suddenly given free run of the corporate candy shop. "We're a large network, and each

The Future of Technology Starts Here

One advantage of working for a sizable company like Lycos is that vendors fight each other to give the CIO sneak peaks of new technologies. But keeping track of all these new opportunities is more than one person can handle, so Tim Wright has assembled a team of bright technology enthusiasts from within the company's ranks to help him make sense of vendor pitches and find out what on the technology horizon could benefit the Lycos network in the future.

The group has four full-time members who do this exclusively. Other Lycos staffers (including the chief of security) also add their advice and expertise to the mix. Their mission, says Wright, is to determine the next technologies that will help Lycos run more efficiently.

To ferret out the bleeding-edge technologies that will give Lycos a boost, the group members read plenty, meet with vendors for demos, get input from colleagues and attend conferences. Wright says the twice-yearly Web Monster conference is an especially useful one for the group "because it's packed with web gurus and oddly intense technology-obsessed people." Members also become experts in specific areas and write up white papers on topics including global network load balancing, service level agreements and assessing security in an effort to determine Lycos' strengths and potential weaknesses.

Many vendors have asked these Lycos future technologies team members to assist them by serving on user advisory councils and committees. Such an arrangement benefits both parties. Vendors seek user insight and input from members of the Lycos team because of their corporate independence (Lycos isn't owned by a larger conglomerate) and their vendor neutrality. And by serving on advisory committees at Akamai, Exodus, Microsoft and Storage Networks, Lycos is able to have "a distinct influence" with its vendors on product direction and development, Wright says.

—S. Deck



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[site] believes that it is the most important piece to us," Wright says with a sigh. "We're also profitable and want to stay that way, which means that there are resource limitations. Sometimes I have to say no." Wright recalls explaining to other network divisions why he intended to spend marketing and promotional resources on newly bought Quote.com and Gamesville.com and not on their sites that had higher visitor counts; with greater growth potential among the newcomers, it made sense to invest in them.

Mix and Match

The Gamesville.com acquisition was exactly what Lycos was looking for—an innovative, sticky website that had found a way to get people to sign up for targeted e-mail direct marketing by tapping into their gaming and entertainment interests.

"We're now looking for [potential acquisitions with] deep content that holds viewers longer and that can also add to our financial results," says Ron Sege, executive vice president at Lycos. Both Gamesville.com and Quote.com, a September 1999 addition, have average user session lengths of more than an hour, and Gamesville.com's business model—built around sophisticated database direct marketing to registered users—was particularly enticing, both on a financial and technological level.

It's not just finances and technology that Lycos takes into account when contemplating an acquisition. "We want to make sure our cultures are similar" before taking on a new acquisition, says Sege. "If they're interested in the [site] user experience, if they've built a great infrastructure and if they either make money or have good potential for making money, they'll be a good fit."

The acquisitions planning starts long before Wright gets involved, but his expertise is called on to make sure Lycos isn't about to purchase a technology mess. In any acquisition, the CIO can look for potential trouble in several areas. If the fundamental business of the

Finding the Best

Another of the first things Wright does when Lycos makes an acquisition is sit down with the new teams and learn what they do well. "I want to know who we've just brought on board, what each individual's expertise is, what motivates him or her and where the core expertise of the company lays," Wright explains. In doing so, Wright determined that the network operations center run by Quote.com was just what Lycos needed for a corporate command network monitoring center. He centralized all network monitoring there and reorganized all of Lycos' disparate operations teams so that they now respond directly to this center rather than to a chain of command in their former company.

Along the same vein, Wright turned up a team of reporting experts who had joined Lycos when it spent \$83 million to acquire Wired Digital in October 1998. The team had built a very scalable and robust reporting and data extraction process for Wired using Red Brick and Informix, so Wright put them to work as his core enterprise reporting team. Now all network management, product and traffic management, and financial reporting is centralized under this one group.

In addition to gaming expertise, the purchase of Gamesville.com brought on board many skilled database developers, since Gamesville.com's business model depended on tailored database marketing campaigns. Before the acquisition, Lycos had its own group already working on game community development. Wright quickly moved the best of that bunch in with Gamesville.com and pulled out Gamesville.com's best database experts to be part of a central database team. This group now helps each portion of the Lycos network—from Angelfire and HotBot to GuestWorld, Tripod and WhoWhere—set up, refine and optimize its database resources.

Wright's knack for finding the best and the brightest is a skill that Lycos was looking for. "When Lycos approached me initially, they

Lycos is discovering that letting acquisitions live on works well, especially in the dotcom world.

company is built on old technology and excising that creaky piece will cause the business to crumble, it's best to steer clear. Lycos particularly looks for outdated databases, software applications that have been too heavily customized, older operating systems and system components that have a history of not scaling well.

In its under-the-hood inspections, technology troubles caused Lycos to pull out of two potential acquisitions, Wright says. One of those companies has since gone out of business; the other is still independent.

were quite vague about what they needed," Wright recalls. "They said, 'We know we need help building a reliable, scalable infrastructure, and we don't know how to leverage the skills we have on board. Can you do that?' To accomplish that, I've spent a lot of time with directors, managers and developers asking them about their specialized skills. I've found that we have within our ranks one of the finest collections of technical people around."

Wright has also used this technical skills collective to build a central

ENTERPRISE SYSTEMS MANAGEMENT



By Robb Dongoski

Ernst & Young, North American ESM Advisory Leader

>> Reboot your company

There used to be a human between your customer and your IT systems: a thinking person that could act as a buffer and mask the sometimes chaotic workings of your organization. But with e-commerce, that's beginning to change. E-business cuts the human out of the equation, and allows your customer to see right through to the inner workings of your company—good, bad and ugly.

These days, with dotcoms and e-businesses all the rage, it's tempting to concentrate all your IT efforts toward the Internet.

But now, while you're trying to implement those new technologies, is exactly the time that you should consider Enterprise Systems Management (ESM). ESM is not just about software frameworks and point solutions, it's all about the people, processes and technology components of IT, and how to manage the operational aspects of an IT environment.

Today, many companies are jumping into electronic business, as well they should—

those who can't adjust to the e-business model are unlikely to survive very long. Most companies have focused primarily on the technological challenges but haven't looked closely at the management aspects of e-business, the key to topnotch performance.

ESM, with its concentration on processes and people—in addition to the technology—can ensure that an organization's systems deliver optimum performance and reliability. ESM casts a wide net, encompassing issues like performance, capacity planning, operations, availability, customer management, and

security (see Figure 1, page S2). It provides the mechanism to effectively manage storage, applications, users, IT assets, and more.

ESM Today

ESM is misunderstood by many organizations. Users continue to equate ESM solely with technology. As a result, they've often failed to reap all the benefits that ESM can provide.

Most of the time, implementing ESM has meant trying to implement ESM software tools. The projects have rarely been completely successful, but the responsibility for this doesn't rest

ESM Scope



The major ESM disciplines, represented in the figure above, are supported by a solid foundation of people, strong IT processes and enabling technology.

Figure 1

IT is a key strategic component in today's information-based, Internet-centric economy. As every business rapidly transforms into e-business to one degree or another, ESM becomes the mechanism that ensures efficient operations and delivers the level of customer service needed.

ESM Obstacles

Interest is high, but there are obstacles to achieving effective ESM. Our experience indicates ESM challenges can be overcome. The keys to success include effective planning, a thorough understanding of ESM complexity and a focus on optimizing core IT processes.

First, organizations simply expect too much from the software alone. These software tools are often difficult to implement because the needs they address are complex. Over time, software suppliers and ESM customers have come to recognize that expectations of software have been somewhat overstated.

Second, many organizations don't have the process and organizational structures in place to get the most out of the software tools they do buy. In the most successful implementations, ESM software is accompanied by process reengineering efforts.

For example, a telecommunications company recently implemented a large ESM software framework. Rather than lowering costs and improving efficiency, they'd achieved exactly the opposite because the company hadn't reengineered its processes along with the software. The company had, in effect, invested heavily to automate cumbersome processes, making the bad processes worse. After analyzing their IT processes, we helped determine that process reengineering would increase their overall return by more than 100 percent.

Third, many organizations begin these efforts with unclear or unrealistic goals. As a result, the scope of these ESM efforts is too broad and unfocused. Often, the efforts lack even a coherent starting point. No wonder they do not reach their expected returns.

One final reason, companies fail to align people and responsibilities. One financial institution, for instance, spent \$10 million on an ESM framework without achieving any measurable benefit—there wasn't sufficient buy-in at the upper management level. Nobody with sufficient authority was pushing for the success of the project, or even measuring the progress of the effort. Once a properly structured project team was assigned, with the right competencies and expertise, the effort took off.

solely with the software. True, the tools—often complex and immature—may have failed to deliver as promised, but more often than not, companies failed to improve the people and process components as well. Frequently, the results were expensive disasters.

For example, a utility company recently purchased a costly ESM software package. The company bought a complete suite of software products, assuming that they would provide a stable framework on which future projects could be placed. However, the organization never really analyzed the processes the software was attempting to automate, and never assigned a full-time team to the effort. As a result, they deployed less than half the software they'd bought, and never reached the initial goals they'd set for themselves. This disappointment also cast doubt on future IT initiatives.

You Need ESM

Even though companies have had problems implementing ESM in the past, interest in the discipline is climbing. Several forces are driving that interest:

>> **Distributed IT**—Most organizations' mission-critical systems are no longer neatly consolidated in one place. They're spread across the enterprise, often stretching around the globe. Organizations need to be able to effectively manage and coordinate these dis-

tributed environments, and ESM provides the foundation.

>> **E-business**—Company systems are being extended via the Internet. They now embrace customers, suppliers, partners and the public. These widespread systems create a demand for high availability, scalability and security. ESM can help with this demand by importing some of the hard and fast disciplines from the mainframe world to the fast paced world of e-commerce.

>> **High IT Costs**—Over the last ten years, the cost of IT has been increasing at dramatic rates. That's no surprise—IT is being called upon to take on more and more tasks, and trained IT workers are at a premium. The goal of IT departments should be to do more with less, and get optimum leverage out of every IT dollar. ESM can help by optimizing the process behind the technology, and that means more bang for the buck.

>> **Skills shortage**—As noted, trained IT workers are at a premium, and the situation is only going to get worse. Meta Group, Inc. says that there will be over a million unfilled IT jobs worldwide by next year. Organizations can no longer count on throwing more people at information system challenges—they need to gain peak productivity from the IT people they already have, and ESM can help.

Effective ESM

Whether you realize it or not, your organization is practicing ESM. Every company does, at some level or another. Whenever you perform backup, maintain a help desk, upgrade software or plan for disaster recovery, you're practicing ESM.

For most organizations, however, the ESM efforts are ad hoc and uncoordinated. The results are inefficient, ineffective, and incomplete. ESM becomes a series of unrelated activities and tasks rather than well-planned and managed processes.

We strive for a balanced approach to ESM. While we acknowledge the importance of ESM technology, we also focus on process and people. That means concentrating on methodology, reengineering, personnel and organizational issues, not just on software.

This balanced approach—people and process as well as technology—avoids many of the problems that have plagued ESM in the past.

An average ESM project can be broken down into manageable components lasting three to five months. We've found that each project goes through a five stage lifecycle: Vision, Analyze, Design, Implement and Measure (see Figure 2). There are potential problems in each of these stages, but there are potential benefits, too. Through all five stages, strong executive sponsorship, focused project direction and the involvement of users are vital to the success of the project.

The ideal way to begin an ESM project is to start at the vision stage. However, some companies may already be in the midst of an ESM project. Regardless of the ESM lifecycle stage you are in, Ernst & Young's experience indicates significant benefits can be obtained from re-assessing where you are in the lifecycle and determining the next best steps.

Using this approach, we help organizations identify the stages with the highest value areas, and then set the priorities for the project. By focusing on the high value areas first, you see a payback early, and that payback can be used to fund the future stages of the project.

High payback areas typically include user and security administration, asset management (hardware and software lifecycle management from acquisition through disposal), and customer service management including help desk. One global bank we worked with generated \$135 million in savings over four years through focused ESM initiatives.

Your Future is ESM

When done correctly, ESM certainly produces attractive savings. Most of our clients achieve a 50

ESM Lifecycle

Figure 2

Stage	Stage Characteristics	Recommended Next Steps
Vision	>> Fragmented IT processes >> Some ESM disciplines have been addressed in pockets throughout the organization >> Enterprise wide focus has not been established	>> Establish project executive sponsorship >> Identify key stakeholders >> Execute diagnostic to define primary ESM improvement objectives
Analyze	>> Sponsorship and stakeholders are in place >> Objectives have been established >> IT processes are not well defined >> ESM technology tools need to be evaluated	>> Establish specific technical and functional requirements >> Develop high-level future state ESM architecture >> Evaluate available and existing ESM software capabilities
Design	>> A comprehensive plan is developed to achieve future state ESM architecture >> Users have not been adequately trained >> ESM software tools have not been implemented yet	>> Develop a focused, core project team >> Develop a solution prototype >> Define and document future state processes >> Develop a phased development and implementation plan >> Engage users during prototype development and testing—their input is vital, it makes them an integral part of the process.
Implement	>> Implementation of software technology is under way >> IT processes have not been completely reengineered >> Organizational changes are needed in order to be effective >> Executive sponsorship is critical >> Users need training of both processes and technology	>> Execute your implementation plan >> Manage organizational changes to mitigate project risk >> Over-communicate project success; "market your wins" >> Refine process design documentation >> Document functional responsibilities
Measure	>> Performance metrics are not readily available >> Tools and processes may not be in place to provide meaningful performance information >> Performance metrics are not aligned with customer expectations	>> Define key performance indicators based on customer expectations >> Define ESM measurement processes >> Compare "current state" versus desired "future state"

to over 200 percent return on their ESM investment, but there's more to ESM. It allows managers to effectively manage their organization's systems as a valuable resource.

With ESM, managers can run systems the way they run the rest of the business—with a clear view of the underlying process. From an enterprise-wide perspective, managers can drill down to examine specific problems, and new applications or systems can be introduced without increasing

IT costs or personnel—In short, ESM provides the foundation to support business growth. 

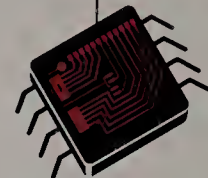
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Shopping Basket

Lycos has been on a buying spree, spending nearly \$685 million on acquisitions since February 1998. Its haul includes the following:

February 2000	Valent Software	Developer of community-building software	\$45 million
November 1999	Gamesville.com	Games website	\$207 million
September 1999	Quote.com	Financial services website	\$78.3 million
August 1999	Internet Music Distribution Inc.	Developer of Sonique PC audio player	\$37 million
October 1998	Wired Digital Inc.	Developer of HotBot, Wired News and Suck.com	\$83 million
August 1998	WhoWhere	Online directory, e-mail and homepage building	\$133 million
August 1998	GuestWorld	Developer of online guest-book services	\$3.9 million
April 1998	WiseWire Corp.	Developer of customized and personalized search tools	\$39.8 million
February 1998	Tripod Inc.	Online community developer	\$58 million

architecture team that advises him about new and innovative technologies. (See "The Future of Technology Starts Here," Page 134.) "This group is charged with finding technology that will help us deliver more and larger content faster and more reliably," Wright says.

Not So Fast

Tom Nolle, president of CIMI Corp., a Voorhees, N.J.-based consultancy, says Lycos will be challenged to lay out an infrastructure to fit its business model because "a large business model requires focus and planning far ahead, which is almost contrary to what's happening on the internet." Wright responds that Lycos doesn't have a traditional slow-moving corporate culture. "When we identify a need, we move very quickly," he says. Wright explains that he is planning for future network needs by centralizing basic network functions. At the same time, Lycos allows divisions to stay flexible and responsive by letting them focus their attention and expertise on their core products and their competition. If they see something that needs to change, they can quickly adjust it because they don't have to cut through layers of corporate tape.

Not everything Wright has tried has worked. "I thought I could centralize customer service because that worked well at The Learning Co., but it didn't work here," he says. "Customer service is product-centered, and the type of specialized support required for a financial site such as Quote.com is completely different from the support Gamesville.com needs." Lycos had even scouted locations for a centralized service center but hadn't yet begun to evaluate technologies when Wright scrapped the idea after an early look at a potential staffing costs.

Lycos is still also working out the kinks in its universal registration process. In order to make personalized Lycos Network services

such as MyLycos or Quote.com useful, each site requires information about the visitor. Wright and his developers are attempting to fold as much of that registration process into one form without slowing down site performance. "It's a complex balance. We're building a robust system to handle up to 1 million registrations a day, while keeping in mind that we don't want to affect an individual site," Wright explains.

Even with these small stumbles, Wall Street observers think Lycos has approached the acquisition process very well. "It was one of the early leaders in acquiring [internet] market share through strategic acquisitions at good prices," says Andrea Williams Rice, managing director of internet research at Deutsche Banc Alex-Brown in San Francisco. "Wall Street's perception of Lycos has changed because of how smart it has been in making acquisitions and how well it has integrated them. It's pretty impressive to see Lycos take on so many acquisitions and still be one of the few internet-based companies that's turning a profit."

Wright and Lycos feel that they've found the right way to bring in acquisitions under their corporate umbrella, nurture and feed them, and turn them into productive and profitable scions. They give them room to grow by pruning off and centralizing some of the basic everyday administrative and network functions, but Wright knows that too much heavy-handed oversight will crush entrepreneurial spirit.

"My job is to help Lycos deliver content faster, cheaper and better," he says. "So far, by combining our resources the right way and using the staff to its best advantage, I think we're doing just that." **CIO**

Stewart Deck didn't win Gamesville.com's NCAA basketball pool, but he's still alive in the backgammon tournament. Bring him back to reality by sending an e-mail to sdeck@cio.com.

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A man in a dark suit, white shirt, and patterned tie is smiling and looking towards the camera. He is holding a silver laptop in his right hand and a black folder or binder in his left hand. The background is a plain, light-colored wall.

American Home Products'
Derek Bluestone has found
that real savings get lost
in the jumble of assets
that goes unchecked
at most companies.

*Keeping tabs on all your IT assets may seem nearly impossible,
but a formal approach and the right systems can make it pay*

Controlled substances

BY KAREN D. SCHWARTZ

For many years, American Home Products Corp. managed its IT assets in a helter-skelter fashion, like many other large organizations at the end of the 20th century. Each of the sites in the Madison, N.J.-based company's pharmaceutical division managed its own hardware and software using a different spreadsheet or database, or manual list of assets. Derek Bluestone, the division's senior manager for global IT sourcing and acquisitions, admits the process was inconsistent and company executives had little idea what assets the division had, what they cost, how those assets were being used and even why they had been purchased in the first place. What's more, the division was beset by duplication of effort in PC procurement and management, multiple software and hardware surveys undertaken by different departments, and incomplete and inconsistent information across the board.

And that's not the half of it. Company analysts weren't able to adequately track whether vendors were submitting invoices for software maintenance that adhered to contractual

caps. And financial analysts found it impossible to match up the return of leased equipment to schedules or compare quarterly invoices with the proper cost formulations.

"We finally realized that not knowing what we had was costing us a lot of money," says Bluestone. For example, desktop and notebook inventories were gathered several times each year but were stored in inconsistent formats ranging from spreadsheets to Microsoft Access databases. Sometimes the division paid outside vendors to take inventory; other times it had to allocate internal resources. And because most of the division's notebook computers are leased, Bluestone adds, "we were actively looking to reduce the payment of interim rents for older equipment after the leases expired."

Reader ROI

- Discover the hidden costs and savings in comprehensive asset management
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- Find out what asset management practitioners have learned

After surveying the situation, the division estimated it was spending \$250,000 annually in hard costs—much of which Bluestone and his team believed could be eliminated by adopting a formal asset management approach.

The \$14 billion global pharmaceutical and consumer health-care products company has since embarked on a multiyear campaign to gain control of its sprawling IT assets, which include as many as 30,000 PCs and a slew of other IT equipment and software scattered around the world. Besides saving considerably in hard costs, the new approach should substantially cut network infrastructure maintenance expenses. In Bluestone's division, for example, his team can now use asset management reconciliation processes and tools to identify and retire equipment no longer in use. On one annual contract alone, that saved \$150,000. Formal asset management will be a tough job for American Home Products—but Bluestone is convinced it will pay off big.

Controlling Your Environment

More and more companies are finding that their IT environments are getting out of control and are opting for a formal, comprehensive asset management strategy that not only tracks hardware and software assets, but also manages software licenses, equipment contracts and leases, and networks from cradle to grave. The goal for many companies is to start managing an asset even before it is purchased, keep tabs on it during procurement and follow it through the loading dock, installation, loading and managing software on the asset, and right through to recycling.

Although it is common for companies to implement certain asset management practices on their own—such as centralized procurement and standardization on a number of supported configurations—it would be quite difficult for them to implement a strategy encompassing IT, finance, facilities and suppliers

Nonstandard Issue

Managing wireless devices often consists of simply knowing they're falling through the cracks

Businesspeople rarely leave their desks without some variety of wireless equipment—notebook computers, cell phones, personal digital assistants and pagers are the accessories du jour. The increasing use of these devices presents a nettlesome challenge for companies looking to track assets. By their very nature, these devices don't stay in one place for long and are off the corporate intranet much of the time, making them difficult—if not impossible—to track. Centralized administration is the heart of asset management, and “wireless devices spend a lot of time sitting in someone's back pocket,” says Kevin Burden, a senior analyst in the asset management services division of IDC in Framingham, Mass. “There is simply no way to poll the network and find out how many handheld devices you have out there.”

Wireless devices are also difficult to manage because they are so portable. “Joe might leave the company on the same day that Mary joined, so somebody has the great idea to give Joe's laptop to Mary. All of a sudden, a unit manager

realizes she is being charged for Joe's laptop when Mary is in a different division,” explains Sue Ben, formerly director of distributed technology and now business-to-business IT director at Sears, Roebuck and Co. in Hoffman Estates, Ill.

But IT managers don't seem particularly worried about tracking these devices. First thing's first, they reason—and that means having good, centralized control of expensive IT assets before even considering tracking mobile devices. “We plan to eventually manage wireless devices with the same tools we are using for other IT assets, but it's last on the list,” Ben says. Ideally, the company would like to implement a web-based system that will allow employees to manage and track mobile devices in a self-service manner.

Derek Bluestone, senior manager for global IT sourcing and acquisitions at Madison, N.J.-based American Home Products Corp., says quick usage cycles—as fast as six to eight months—make the units particularly frustrating to track. So the company has decided to focus its new

asset management system on the bigger ticket items first. “As our strategy around nonstandard devices becomes more mature and as the market becomes more mature, we'll see whether it makes sense to track those devices,” he says. “But for now, we're not using the system to track them at all.”

Although it's at the bottom of corporate to-do lists now, tracking wireless units will become more important over time. “Even though the majority of IT departments haven't yet committed a formalized support program for them, you know help desks are getting calls,” Burden says. “What will probably happen is that companies will realize how much time users are spending supporting themselves and their neighbors. Eventually, they will direct the IT department to develop support policies.”

The only way IT departments will be able to deliver support efficiently, Burden says, is to mandate the procurement of a small subset of handheld devices so they can be as familiar as possible with the devices they are supporting. —K. Schwartz

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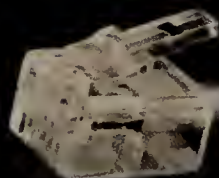
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Asset Management

without using packaged applications, says Kevin Burden, a senior analyst in the asset management services division at IDC, a Framingham, Mass.-based IT consultancy and sister company to CIO.

If it is done right, implementing a formal asset management strategy can really cause savings to mount, especially when measuring total cost of ownership (TCO), Burden says. For example, at a 1,000-user site, the average annual staffing cost per PC is \$5,236. When IDC looked at data from sites that don't practice asset management, that number jumped to \$5,593. Sites that practiced asset management were able to cut their costs to an average of \$4,880—15 percent lower than the nonpractitioners.

Cutting costs is exactly what Sears, Roebuck and Co. of Hoffman Estates, Ill., had in mind when it decided in late 1997 to install an asset management system. The company manages more than 300,000 pieces of hardware used by more than 320,000 employees in the United States. The move away from green-screen terminals in the 1990s and then the need to account for each and every piece of software and hardware in preparation for Y2K precipitated Sears' development of a comprehensive asset management strategy.

Once the company began switching employees from the green-screen environment, its PC inventory snowballed—Sears has deployed about 45,000 PCs within the past few years. The company also began shifting from mainframe systems to client/server-based systems, and the number of IT assets skyrocketed. But above all, the impetus was time. "Y2K was a real eye-opener because it was the first time we had to determine what we had and what it was capable of," says Sue Ben, former director of distributed technology and now Sears' business-to-business IT director. "It

forced us to have to know the longevity of each asset, whether the asset was currently in use, if it could be reused, if we could protect the asset and how we could manage the asset."

It was in 1997, too, that American Home Products executives had finally had enough and resolved that out-of-control inventories and wasted money didn't have to be a fact of life. Slowly, they began to realize that enterprise asset management was a core IT discipline—alongside problem management, change management, service request management and service-level management. What the pharmaceutical division needed, they decided, was a comprehensive system to track hardware and software assets, as well as software licensing agreements and equipment leases. Its 12-member Global IT Sourcing group chose a comprehensive approach because of the complexity of the cost trail and relationship trail of IT assets, which included the initial purchase cost, the department or project budget that paid for it, recurring maintenance costs, related costs from software and service, the cost of administering and maintaining the asset, and upgrade and add-on costs.

Bluestone explains, "I may have a mainframe with 50 or more software licenses on it, and each one of those licenses has a maintenance stream. And for the mainframe hardware, there's a maintenance contract and cost stream. There are contracts for each one of those licenses with specific terms and conditions that need to be managed and adhered to." By early 1998, the team had chosen Argis, from Pittsburgh-based Janus Technologies, which it uses in conjunction with Lebanon, N.H.-based Tally Systems' NetCensus to manage its IT assets. Argis allows the division to link software asset records to legal document and hardware asset records. "Effectively, we are able to look up a server to see what software is running, maintenance renewal dates and maintenance caps, and the specific grant of use of the license," Bluestone says.

A different situation inspired Williams Communications Group to implement an asset management system. The Tulsa, Okla.-based provider of carrier network products and services was launched by its parent, The Williams Companies, about two years ago and has 9,000 employees in 150 offices around the world. "We've seen our assets grow incredibly quickly and dynamically," says Randy Tucker, the company's vice president of infrastructure. "An asset might be on one desktop today and another one tomorrow, and configured one way today and another way tomorrow." After consulting with Gartner Group on the most appropriate system for its needs and conducting its own

Sue Ben, business-to-business IT director for Sears, credits Y2K remediation with unearthing all of Sears' assets and extending their longevity.





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evaluation, the company chose AssetCenter from Peregrine Systems of San Diego because it met its primary criteria of ease of use and robust functionality.

"We have about one-third of our PCs coming off lease this year, and one of our business units has added about 2,000 PCs. That constitutes a pretty big chunk of our asset base," Tucker says. "That, combined with the expected growth we have going forward, made us recognize that using Excel spreadsheets to manage our assets just wasn't going to cut it anymore."

Step-by-Step

Before an organization looks for an asset management package, experts recommend taking several steps. The first, Burden says, is understanding the businesses that the IT department serves, along with those business units' goals and objectives.

The next step is identifying current technologies serving the business. By using the type of system management tools most

Asset management has meant consistency and purchasing power for Marriott International franchises around the globe, says CIO Carl Wilson.



organizations already have in place—such as Microsoft's Systems Management Server (SMS), Hewlett-Packard's HP OpenView, Computer Associates' CA-Unicenter, Tally Systems' NetCensus or one of several tools from Tivoli Systems—companies can accurately count physical IT assets, including the version of each software package installed on a hardware asset.

Like any other big project, it is critical to obtain buy-in from upper management and the rest of the organization before proceeding to a more comprehensive undertaking, or the project is likely to fail. "We've been actively involved in asset management now for almost two years, and one of the biggest lessons we've learned is that support from senior management to implement and monitor the program is a must," says Carl Wilson, CIO of Bethesda, Md.-based Marriott International. "Individual users have peripheral vision on what they want to accomplish, but somebody with overall accountability for long-term costs and strategy can really understand the value of having effective management of IT assets. For us, it's been a top-down directive to proceed with asset management; without that, we wouldn't be as successful as we are."

Given the go-ahead, the team should then determine criteria for choosing a system based on the function it wants the system to provide to the company or the business unit. Sometimes, managing software licenses is the prime mover; other times, it's a dire need to track leases. Sears took about six months to develop a strategy and another three months to search for appropriate products. During that time, the asset management group systematically looked at what it would take to bring together financial management with recording and procurement of assets, lease terms and software licensing terms. Complicating the selection process, the chosen tool would have to interface with the company's custom-developed accounting system, a PeopleSoft HR system, a facilities management system and a contractor badge management system. Sears finally chose a system from MainControl of McLean, Va., that also works in concert with Tally Systems' NetCensus, which Sears was already using, as well as with Microsoft's SMS, a component added later.

At Marriott, executives watched for years as property owners and franchisees bought hardware from no-name manufacturers with depreciation or amortization cycles of up to five years, when two or three years might have been more appropriate. "We found that individual owners wanted to depreciate PCs over a longer period of time than their effective use, but doing that with the relative cost of technology coming down, they may end up having an asset on their books that has a higher book value than its true market usage value," Wilson says. Using asset management and establishing relationships with major PC providers around the world, "we can remove that problem from our franchisees and owners, because they can



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now get the technology when they need it by doing an operational lease and leveraging Marriott's total procurement power. That way, our owners and franchisees could project a consistent cost, and total cost of ownership would decrease."

Another strategic concern shaping Marriott's criteria for selecting a vendor was the treatment of software licenses. "You want to protect against pirated copies and make sure you have the most current version. Our people out in remote locations may not be aware that software they are picking up may be pirated. We needed a central way to control that so we can make sure Marriott honors its commitments to all of its suppliers," Wilson notes. "And by being able to explore what is on the network, we can see what equipment and capacity everyone has, which can help us get ready to do a major software upgrade, while also helping us better control our capital expenditures." Marriott now uses Asset Insight from Cary, N.C.-based Tangram Enterprise Solutions in concert with tools from Tivoli Systems to manage its IT assets.

By employing an asset management strategy, a company can avoid letting vendors dictate what to upgrade. "Without asset management, companies might end up buying the products and technologies that are showing the best profit for the vendor instead of the technologies they really need. And there is a real savings in knowing exactly what software licenses you have," IDC's Burden notes.

DO'S AND DON'TS OF ASSET MANAGEMENT

do's

Do focus on soft cost savings.

Do get buy-in from upper management.

Do determine your "pain points"—the areas that would benefit the most from asset management—before you begin.

Do go for the biggest return on investment first; that way, you reward your executive sponsors.

don'ts

Don't neglect the hard work of setting practices and policies within your company to make the system truly effective.

Don't think of asset management as an accounting system; it is a way to manage the accounting of an asset.

Don't try to do everything at once; start slowly and expand as it makes sense.

Don't expect results overnight; asset management is a long-term process.

—K. Schwartz

Start Slowly

Once a company chooses an asset management strategy and package, the temptation is to install everything as quickly as possible. That can be a big mistake. "If you try to do it all at once, you are going to run into a lot of organizational boundaries. Start in one area, like help desk, where you only have to deal with gathering inventory data so that you can distribute software more rapidly or provide technical support resources more readily," advises Christopher Germann, MainControl's vice president of corporate strategy. "Or you could start on the finance side, focusing on keeping track of all of the different machines under lease."

Burden agrees. "To show success, start by attacking a problem you know you can solve," he says. "Turning on all the modules at once is overwhelming, and you are dooming yourself to failure."

That incremental approach is the one American Home Products took. The company began by implementing its asset management system only in the pharmaceutical division's 20 U.S. sites but plans to extend it worldwide within the next year or so. Bluestone believes the project would have failed otherwise. "You are inviting yourself into each functional group's work stream, and each one entails a completely different process. You have to understand how people use their assets and leverage the resources within those groups to get the data in

the form you need it. That takes time. The only way to do it is by implementing a phased approach," he says.

Payback

Implementing an asset management system is far from cheap, but experts and users alike believe the rewards can be enormous. For example, Peregrine Systems' asset management applications cost anywhere from \$80,000 to \$150,000 for the software alone, and another \$90,000 to \$180,000 for training, installation and customization. Both Marriott's Wilson and Williams' Tucker say those prices are typical but stress that the costs are small when compared with the savings these kind of systems can generate.

For example, on the hardware side, it can cost anywhere from \$300 to \$1,800 per machine to have a computer moved or reconfigured. Sometimes it's actually cheaper to dispose of that piece of equipment and bring in a new one, and asset management systems can help determine



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that. Bluestone estimates that his company can conservatively save about \$1 million over a three-year period—and those are just the hard costs. Reducing soft costs like managing IT leasing transactions, invoice reconciliation and time spent gathering ad hoc asset inventories, which are hard to measure but add up quickly, will yield considerable additional savings, he says. Sears' Ben says her company estimates a six-month payback through better management of leases, technology redeployment and reuse, and lower TCO for workstations. "Our goals are to reduce TCO on an ongoing

provider (ASP) model. It may be a confusing time for companies as they try to manage software bought under old-style agreements along with software rented through an ASP. Even so, asset management will probably shift away from being a "power user" application to a self-service application.

The ASP model will undoubtedly affect the way American Home Products licenses software, pays maintenance fees and deploys technology capabilities, Bluestone says. "From an overall process perspective, asset management will become even more critical for enterprises considering ASP hosting," he says.

"Until companies get a thorough understanding of their IT assets, it's impossible for them to effectively control their costs."

—Kevin Burden, senior analyst, IDC

basis of 3 percent to 5 percent per year with significant one-time reductions as each asset is brought under better control," she adds.

Many companies' chief concern is decreasing TCO and increasing return on investment, and soft cost savings are vital to accomplishing those goals. It's common for some CIOs to overlook the power of reducing soft costs—something a formal asset management strategy can help correct. "CIOs know these soft costs exist, but they don't know how to measure them or control them. Indirect costs often don't get written into the balance sheet, so they are often overlooked," Burden says.

Another soft cost savings strategy involves help desk support. By having information on all the company's computers on one system, a help desk employee can see a profile of all equipment and training an employee has within a few seconds of typing in that employee's name and ID. That reduces call time because help desk staffers don't have to ask as many questions.

The Future of Asset Management

Many organizations still manage their assets in a haphazard way, but because of the proliferation of PCs in the business environment, the pressures of internet time and the structure imposed by Y2K remediation, that is changing. Two or three years ago, you'd have been hard-pressed to find an asset management department or even an employee with the title of Asset Manager, but it is no longer such a rarity.

Asset management practices are no more static than a company's technology infrastructure. The popularity of the internet for delivering software and licensing models means new delivery mechanisms and contracts. Asset management systems will change to support trends toward outsourcing software applications and management through the application service

American Home Products has come a long way since it began implementing asset management in 1998. As of this spring, the pharmaceutical division has accomplished its enterprise asset management objectives from an architectural, program and process management perspective. The division has a single corporate system for recording IT assets and contracts and consistent asset management processes across the board. Still, Bluestone and his team continue to push the envelope with a carefully planned, phased approach that includes making enhancements both to Argis and NetCensus. Currently, Bluestone's team is working on an initiative to provide "dashboard" enterprise asset management information and online reporting tailored to senior IT management and IT clients via its Global IT Sourcing intranet site, and it is also planning links to the company's problem management system from Santa Clara, Calif.-based Vantive Corp. (now part of PeopleSoft) and to its SAP Fixed Assets implementation.

Choosing the right asset management system is complex, and managing the system is an ongoing effort, but taking the plunge is well worth it, Burden says. "Many companies look at the whole thing as a huge expense. But chances are, most large companies have more IT equipment than their managers think they do. They think everything is fine, but they have more PCs than they have employees, duplicate software licenses and shelves full of old, decommissioned systems," he says. "And until companies operating like that get a thorough understanding of their IT assets, it's impossible for them to effectively control their costs, efficiently install new technologies or even maximize the use of the technologies already in place." **CIO**

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[I keep you up nights]

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How the Tennessee Valley Authority's nuclear division saved time and money by integrating machine-maintenance knowledge and workflow processes

BY CAROL HILDEBRAND

Knowledge Fusion

The Company: The Tennessee Valley Authority

Founded 1933 **Location** The seven-state Tennessee Valley region **Revenues** \$6.6 billion **Employees** 13,322
KM Problem Providing TVA's nuclear division with access to information about plant equipment (maintenance and operating protocols, vendor information, drawings)
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FOR MOST COMPANIES, improper machine maintenance is probably a matter of lost profits: A little downtime, a screwed-up order, an unhappy customer. The Tennessee Valley Authority's nuclear division must play for higher stakes, however. For them, maintenance could be a matter of life and death.

That's why the TVA, the nation's largest public power supplier, overhauled its nuclear division's maintenance management system, creating a centralized knowledge management system that cuts time and errors out of the cycle.

Serving nearly 8 million customers, TVA uses a mixture of fossil, hydroelectric and nuclear energy. TVA Nuclear's three facilities represent about 20 percent of TVA's generating capacity. After analyzing TVA's major business processes, a group of TVAN senior executives targeted the maintenance management process at TVAN as a prime candidate for improvement. For one thing, the tools currently used were not Y2K compliant; for another, maintenance work relies heavily on documents such as vendor manuals, drawings and formally regulated work instructions.

"It's document management, which requires so much paper, that it's always a target," says Karl Singer, senior vice president of nuclear operations at TVA. TVAN estimates that nearly \$48.7 million was spent annually generating, planning and performing maintenance work orders in this heavily regulated and safety conscious industry. The executives tapped individuals from various groups at the Browns Ferry Nuclear Plant to develop and pilot the program, with input from the folks at the two other nuclear plants in the TVA network.

They needed to couch the new system in terms of the **overall** versus the **individual** benefits.



TVA Nuclear's project team (from left): Karl Singer, Donnie Martin, Sonja Bridges, Dale Johnson, Robert Rupe

The group started by analyzing the current state of affairs, looking for places to consolidate work and deciding what performance metrics they most wanted to improve, says Robert Rupe, the process improvement manager at TVAN and the person responsible for coordinating TVAN's various process improvement efforts. Since more than 14,000 work orders are written annually at Browns Ferry alone, there was room for significant savings through productivity improvements. They then charted the existing work-order and procedures-management processes, conducting more than 350 hours of interviews with plant employees and also benchmarking the maintenance processes of 15 utilities and six other companies.

One of the big "aha!'s" says Rupe, was just how closely the planning and execution of maintenance work orders was linked to procedures management and document workflow. For example, a typical handwritten work order came attached to various paper copies of machine diagrams, docu-

mentation and procedural instructions. But the work orders lagged behind document and procedural revisions. "Most of our work is planned two months ahead of time," says Rupe, and some orders are planned six months to a year in advance. Meanwhile, "We're constantly getting new procedural updates from the outside, so stuff gets revised fairly frequently," he says.

After six months of full-time work by seven people, the group produced a work process that combined maintenance order workflow with procedural document management. They built two integrated systems that would support the new processes by linking procedural documents electronically to the work management system. That process would eliminate five or six separate software packages that did not speak to each other or share a common interface.

There was no off-the-shelf software available, so the team partnered with a vendor (The System Works, since purchased by Indus Corp.) in an arrangement that gave process requirements to the vendor, who, in turn, built a commercial product around those specifications. In essence, says Rupe, "We helped define a new off-the-shelf product."

The resultant new system took 28 months from first brainstorm to rollout, says Rupe. It gives workers desktop access to documentation on assets, records, equipment and parts information, and work instructions for all three sites. Now, a work order is generated electronically, routed for approval and attached, also electronically, to the most recent batch of pertinent drawings and documentation.

Moreover, the electronic documents are indexed down to each piece of equipment

in the plant. All three nuclear plants are now standardized on the systems, and the maintenance groups can draw on the repository of previously completed work orders to analyze and manage future activity more effectively.

Lessons Learned

After spending so much time on the analytical and design side, Rupe says, "We butchered change management." The worst mistake was grossly underestimating the computer literacy of the workforce, he says. There were people who'd never used a keyboard, and people who thought the CD-ROM drive was a coffee cup holder. The lesson that TVAN took away, says Rupe, was twofold.

First, the rollout team needed to get basic computer skills up to a standard level. But more important, the group needed to couch the new system in terms of how it improved the overall process rather than what each individual would see. "Because we went to distributed computers, some of the response times were actually slower, and people saw that. But we didn't explain that the overall process would result in huge time savings. We needed to manage expectations better."

The system wasn't cheap: It cost about \$5.1 million initially, and more upgrades are planned. But the savings are equally impressive: The time it took to process a work order dropped from 39.8 to 23.3 person-hours per order, and TVAN saved an estimated \$8.4 million annually in labor costs. And, Rupe says, in an industry driven by cost savings, that's a big payback.

More important, however, the system helps maintenance workers learn from captured data. It might be something as mundane as noticing that the label on a valve doesn't match the label on a drawing; but in the end, such a mundane thing can add up to safety for millions. As Rupe says, "This is a business that requires precision." **CIO**

Have you had success with a knowledge management project? Senior Editor Carol Hildebrand wants to know. E-mail her at cjh@cio.com.

EXPERT ANALYSIS BY THOMAS H. DAVENPORT

Power to the People

TVA's is a fine example of information systems practice, replete with the typical change-management problems and a pretty decent financial payoff. My question, however, is whether it is really knowledge management. A few years back, it would clearly have been called a document management and workflow system. Why adopt the newfangled terminology? Maintenance documents such as those captured and managed by the TVA system can obviously contain knowledge. But accessing and distributing documents electronically was possible long before knowledge management and can be accomplished through a variety of means—not only workflow, but intranets, e-mail, electronic publishing and so on. Are all of these knowledge management applications?

To my conservative mind, whether this is a knowledge management application rises and falls on one factor: that is whether the knowledge flows to and from the maintenance workers. A system that distributes documents along the maintenance process is a document management system. A system that allows maintenance workers to record their own observations about the documents, the process and their day-to-day use on the job is a knowledge management system.

When I talked to Robert Rupe at TVA, he said that maintenance workers have some ability to modify the system's knowledge. They can note that the work plan is inaccurate—for example, they can see that the plan didn't say if insulation had to be taken off before changing a valve. Or they can determine if scaffolding is necessary to do the job safely. These workers note such issues on paper, which later gets scanned into the system for planners to notice and use. What's particularly reassuring is that, while Rupe says they didn't call it knowledge management when they built the system, sharing knowledge within nuclear plants and across the industry is an extremely important goal in the post-Three Mile Island world. When we're talking about nuclear power, I personally would like to see everyone using their brains and sharing knowledge to the maximum degree possible.

So let's say that the TVA maintenance application is at least a knowledge-oriented system. Although it's not the sexiest application around, its existence is good news for knowledge management. It suggests that knowledge management is making its way into the down-and-dirty parts of organizations. It points out that knowledge is an important resource not just for white-collar knowledge workers but for people who use wrenches and valves and flanges as well. The system also indicates that we are finally starting to embed knowledge into jobs rather than adding it on top of them.

The TVA analysts were diligent about ensuring that the flow of knowledge was integrated with the flow of the maintenance process. I hope that we'll see more hybrids of process redesign and knowledge management in the future.



Tom Davenport is a professor of management information systems at Boston University School of Management and director of the Andersen Consulting Institute for Strategic Change. He welcomes reader comments at davenport@cio.com.

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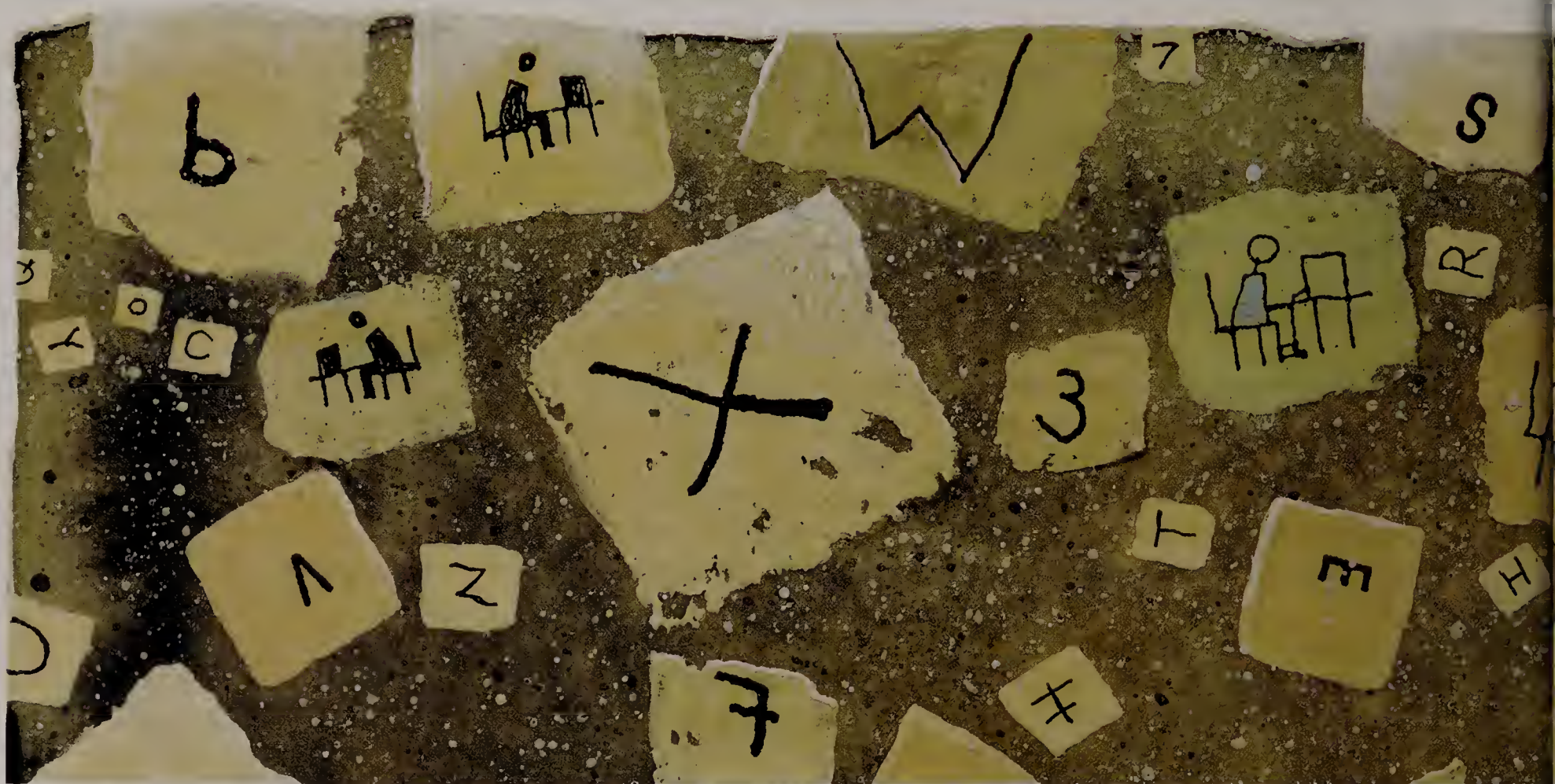
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Chaos

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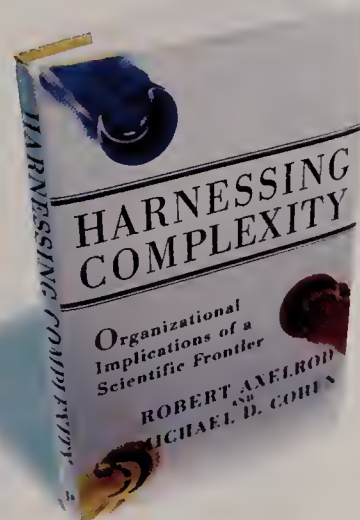
BY ROBERT AXELROD AND MICHAEL D. COHEN



Whenever we forge new strategies, devise new policies or create new services, we are dabbling in the world of complex adaptive systems. Authors Robert Axelrod and Michael C. Cohen define a complex adaptive system as one in which

a single action—such as putting up a website—can lead to unforeseen, even unpredictable consequences. Their new book, *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (The Free Press, 1999), aims to help read-

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ILLUSTRATIONS BY MATTHEW TRUEMAN. PHOTO BY VITO ALUIA

ers understand how to design organizations and strategies in a complex environment. Borrowing ideas from scientific and biological research in which three factors—variation, interaction and selection—shape complex environments, the authors have devised a framework as a way of guiding readers to pose new questions and ponder new possibilities when confronted with complexity.

Why do the authors feel now is a particularly appropriate time to apply complexity theory to business? It all has to do with the information revolution. Given the number of people and organizations that interact in a networked economy, the unpredictable nature of business—and indeed of daily life—is accelerating. The pace and scope of adaptation is faster, resulting in social and organizational upheaval. In the following excerpt, the authors use the development of Linux as an example of variation. The question they ponder: When can an organization or population do better with more variety as opposed to uniformity? The answer revolves around the principle of exploration versus exploitation, a trade-off situation between creating strategies that are untested but may be superior to what exists versus copying proven strategies.



WE CAN ILLUSTRATE the conditions that favor encouraging variety by considering the striking case of the Linux computer operating system

and the method used to organize the work of its developers. The method is known as open source software development. This form of software development has been thrown into the limelight by the spectacular growth of Linux, which has become, in certain key areas of application, a serious competitor to operating systems developed and sold by major corporations such as Microsoft, Sun and IBM.

This is a very surprising turn of events since Linux is given away free by its developers. There is a natural presumption that

free software cannot be as reliable as for-profit software. Yet it is precisely for situations demanding high reliability that Linux has found its strongest support.

The surprise deepens with the observation that Linux is not only free but also the handiwork of an enormous, worldwide

Variety is the engine of rapid quality improvement in an open source initiative.

cadre of unpaid volunteers. By some estimates, Linux is the result of contributions from many thousands of programmers. A computer operating system is one of the most intricate of human creations. This number of cooks would seem more than sufficient to spoil the soup. How could thousands of scattered volunteers make an operating system that is more reliable (and faster running) than those created by dozens, or hundreds, of highly talented programmers working full time for renowned corporations?

Considering the development of Linux as a Complex Adaptive System casts light on some important components of the explanation. We can begin by pointing out that Linux is not the only example of the open source approach to software development. There are many earlier examples, such as the scripting language Perl and the e-mail server Sendmail. The most widely deployed software for serving up requested World Wide Web pages, a system known as Apache, is also the product of volunteers working together in an open source framework. What all the examples have in common is the free availability of the source code, the human readable computer instructions that specify the program. That arrangement provides the generic label for this approach to team software creation: open source software development.

The free access to the source code of Linux means that any programmer with

sufficient motivation can craft changes to the code, creating a new version of the program. This is not possible in traditional development with proprietary code. From a Complex Adaptive Systems point of view, the possibility for volunteers to create working variants increases massively the

variety of the population of operating systems. In successful open source cases such as Linux, that variety has been harnessed to yield a very effective result, although many observers expected chaos to result from the rapid injection of many potentially incompatible variants.

Our framework points to several structural arrangements that work to make the added exploration beneficial, averting the prospect of death by eternal boiling. [Eternal boiling occurs when the level of mutation is so high that a system remains in a permanent state of disorder.] In our terms, when a programmer modifies the source code of Linux, this activity is an endogenously triggered recombination. The trigger is usually an observation of some particular kind of poor performance by the existing standard version of the operating system. The affected user may make an electronic request for help from the large Linux community. Interested individuals respond by suggesting fixes. These small pieces of new code are recombined with the rest of the standard version to produce new variant versions. A period of testing and discussion of the performance of the variants follows. Eventually the best-performing variant is accepted by the small team of key Linux developers, who incorporate the new code into a subsequent standard version of Linux.

When open source development prospers, a central reason seems to be that, as Eric S. Raymond says, “given enough eye-

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balls, all bugs are shallow." For Linux, there are certainly enough volunteers. Equally important, the communication among volunteers about triggering problems and proposed alternatives is precise enough that multiple plausible variants are routinely generated as possible solutions to most problems that bother users. In addition, testing of alternatives is reliable enough that the code that wins out is generally very good code, with unwanted side effects being rare. Thus the variety made possible by the free avail-

An improvement to an operating system is likely to bear fruit over a very long period.

ability is marshaled to produce a rapid rate of improvement in overall quality. By inquiring a bit further into how this is accomplished, we can uncover some clues about when an open source approach is likely to work well—and when it is not.

A crucial fact is that there are two types of Linux versions: standard and variant. The few central managers of the Linux community, led by the originator of the operating system, Linus Torvalds, retain the right to label versions of the system as official releases. Each new official release creates another "standard Linux," and millions of digitally perfect copies are made of it.

This control over the definition of the next generation of the operating system is strikingly analogous to a biological mechanism seen in the emergence of multicellular organisms: sequestration of the germ line. This is a restriction of reproductive

activity to a few specialized cells, while the vast majority of cells in the organism no longer participate in creating the next generation. In both cases, limiting "reproduction" to a tiny fraction of all the agents reduces the chaotic inconsistency that would follow if all variants had equal opportunity to shape the future.

In the Linux case, the centralized control of changes in the standard code makes higher levels of variety in the proposed changes sustainable, so that the "law of sufficient eyeballs" can come advantageously into play. In the biological case, the restriction functions to alter the evolutionary "incentives" of cells making up the organism. Over succeeding generations their strategies will be far more likely to be those that let them prosper as a "team" rather than those that benefit individual cells at the expense of the others. Analogous incentives are created for the programmers in the Linux case.

Numerous experiments are being undertaken in an effort to imitate the striking success that the open source approach achieved in the Linux case. As usual, we do not claim to be able to predict the success and failure of particular efforts. But Complex Adaptive Systems principles do suggest a number of key questions to ask when contemplating an open source software project. As we have seen, variety is the engine of rapid quality improvement in an open source initiative.

We can see that Linux has at least three, and perhaps all four, of the conditions favoring exploration.

I Problems that are long-term or widespread. In contrast to computer hardware and applications programs (such as web browsers), operating systems are among the longest living elements of the computational world. Unix—of which Linux is a free version—dates back to 1969. It runs on mainframe and minicomputer architectures that long predate the microcomputers that now cover the earth. Thus, an improvement to an operating system is

likely to bear fruit over a very long period (as time is measured in the strange universe of computing, with its Moore's Law of doubled computer power every 18 months). Another example of open source development, the Apache web server, also seems to occupy a functional niche where improvements can be expected to have long service. In addition, the gains from any improvement in a standard version of an operating system can benefit thousands or even millions of users, providing widespread benefits.

2 Problems that provide fast, reliable feedback. Linux exhibits this characteristic as well. In its typical role in server environments, its features are exercised at very high rates, and defects become evident quickly. Moreover, open source distribution means that every contributor of a proposed variant can make a completely functional new version that can be tested locally. This further increases the rate of feedback. And finally, the quality of proposed variants can be assessed with relatively high reliability. Speed of operation and resistance to crashes are highly valued criteria across the entire community of Linux developers. Disagreements do occur over how these should be measured, and other criteria are also important. But when compared with other software areas, such as user interface design, the appropriate performance metrics are relatively clear.

3 Problems with low risk of catastrophe from exploration. Various parts of a software system have high levels of interdependence. When there is a premium on speed, as there is for many operating systems, there is a strong temptation to increase even further the interdependencies among modules. This can create a substantial risk of catastrophe. But Unix, from which Linux derives, has long been a partial exception to this tendency. In the Unix-Linux culture there is a well-developed philosophy of modular isolation. A key com-

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CONFERENCE AGENDA

Sunday, June 18, 2000

12:00pm - 5:00pm

Registration

7:00pm - 9:30pm

Pre-Conference Networking Reception

Monday, June 19, 2000

8:30am - 9:00am



Welcome and Opening Overview
Maryfran Johnson, Editor-in-Chief
Computerworld

9:00am - 9:45am



Opening Keynote: "IT Leadership vs. E-Leadership"
Charlie Feld, E-Leader and former CIO, Delta Airlines
CEO, The Feld Group

10:00am - 11:30am



"The Naked Truth About B2B E-Commerce"
Kevin Fogarty, Business Editor
Computerworld

Moderator

Panelists:

Robert Schwartz, VP & GM
Panasonic Corp.

Kathy Brittain-White, CIO & EVP
Cardinal Health (cardhealth.com)

Peter Burrows, CTO
Reebok International

John Keast, CIO/CTO
NetworkOil

Bruce Carver, VP of Informational
Management and Technology
Reynolds & Reynolds

Everybody's talking about business-to-business collaboration as the hottest of the online trends in 2000. But many feel this emperor still has no clothes. This panel will cut through the hype surrounding e-marketplaces, answering some critical questions on the benefits versus the risks. Should your company participate in someone else's B2B marketplace or create your own? When and how do you measure ROI when you're executing at Internet speed? There are multiple decision points for entry into Web-based collaboration, including infrastructure concerns, business application readiness and trust issues between trading partners. As these new business and organizational models evolve, what are the key factors your company must consider? Can it really promote higher sales or lower your production costs? IT leaders from several industries will share their successes and candidly discuss the pitfalls of B2B e-commerce in this interactive session.

11:30am - 12:15pm



Insider View: "Raytheon Corp.'s Unfolding E-Business Strategy"
Eric Singleton, Director of Global E-Business
Raytheon

12:30pm - 1:45pm

Interactive Luncheon with IT Leaders

2:00pm - 3:30pm



"Enterprise Security: Will Only the Paranoid Survive?"
Priscilla Tate, President
Technology Managers Forum

Moderator

Panelists:

Scott Charney
former head of computer crime
investigations, U.S. Department of
Justice and now Partner
PricewaterhouseCoopers

Allan Pailer
Columnist, Computerworld
and Research Director, SANS

Tim Talbot, VP of Technology
Management, PHH Vehicle
Management Service

The costs of electronic attacks and security breaches are rising sharply, more than doubling each year into hundreds of millions of dollars. Every week, it seems, a new high-profile victim joins the list of companies that failed to protect themselves and their customers. Never have the business imperatives of secure commerce been so prominently in the spotlight. For IT leaders, the issues go beyond technical concerns. What are your company's legal liabilities when customer data is compromised? How do you get past political wrangling over budget allocations for security products? What are the questions you should be asking inside your own company -- or of your outsourcers or suppliers? This session will explore enterprise security in depth, drawing out examples, ideas and action items from our expert panelists.

3:30pm - 4:15pm



Afternoon Keynote: "Innovation & Change"
Thornton May, VP of Research
Cambridge Technology Partners

4:30pm - 5:30pm

Premier Sponsor Breakout Sessions 1 and 2

5:30pm - 8:30pm

Expo Open and Reception/Buffer Dinner

Tuesday, June 20, 2000

8:45am - 9:00am

Remarks and Day Two Overview

9:00am - 9:45am



Keynote
David Lord, CEO
Toysmart.com

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10:00am - 11:30am



"ASPs: The Double-Edged Sword of Outsourcing"
Mark Hall, West Coast Bureau Chief
Computerworld

Moderator

Panelists:

Dick Hudson, CIO, Global Marine

John Voeller, CKO, CTO & SVP
Black & Veatch

Sateesh Lele, President
Lele Consulting Group

Tsvi Gai, CIO, CTO & VP of Mergers
and Acquisitions, GBS

Mark Mathias, President
Eureka Digital

James Lubinski, EVP
Galileo International

This latest trend is both an option and an obstacle. As the application service provider market grows beyond the small to medium business space to take advantage of enterprise-class software, leaders are considering ASPs as a serious tool in their technology strategies. Yet will these outside vendors offer sufficient security for your IT operations? Can you control point product offerings from ASPs? How do you insure that ASPs deliver on service level agreements? Will today's high-flyers crash to earth and take your company with them? This panel session will nail down the critical success and failure points, and answer the most pressing and provocative questions that ASPs raise for IT executives.

11:30am - 12:15pm



Featured Speaker
Peter Solvik, CIO
Cisco Systems

12:30pm - 2:00pm

Buffet Lunch and Expo Open

2:00pm - 3:30pm



"Walking the E-Customer Tightrope"
Julia King, Senior Editor
Computerworld

Moderator

Panelists:

Cathy Hotka, VP
National Retail Federation

Joseph Smialowski
Vice Chairman
Fleet Boston Financial

Robert Rubin, CIO
Elf Atochem North America

Manoj Tripathi, CIO and Vice President
Jamba Juice

Technologies such as data mining and customer relationship management software can put your company right in its customers' pockets, not only anticipating their current needs but discovering new ones. But where does e-business cross over that line between customer knowledge into invasion of privacy? Does your company know how to walk the tightrope without falling off? What are the best strategies for leveraging and managing high-impact business data without alienating customers along the way? How are leading companies using technology to sustain old relationships while developing lucrative new ones? Does online customer service differ from the traditional approach? This panel session will explore the positives and the perils of the customer connection.

3:30pm - 4:15pm



Insider View: "Taking Care of E-Customers at Autobytel"
Ann Delligatta, COO
Autobytel.com

4:15pm - 4:45pm

Premier Sponsor Breakout Session 3

4:45pm - 6:30pm

Expo Open and Reception

7:00pm - 9:00pm



Premier 100 Awards Presentation and Gala Dinner
Featured Keynote: Jim Yost, CIO
Ford Motor Company

Wednesday, June 21, 2000

8:45am - 9:00am

Remarks and Closing Day Overview

9:00am - 10:30am



"How to Win the Hiring War Between the 'Dots' and the 'Nots'"
David Weldon, Careers Editor,
Computerworld

Moderator

Panelists:

Irene Dec, VP of International
Investments, Prudential Insurance Co.

Margaret Schweer, HR Director
Kraft Foods

Robert Bruce, CIO, Allmerica Financial

David Foote, Managing Partner
Foote Partners LLC

Jim Prevo, CIO, Green Mountain Coffee

Fran Quittel, Columnist
Computerworld

Many traditional companies are reeling from the impact of the dot com drainpipe, as sexy little startups pull top talent from the employee ranks. Beyond the stock options and the thrill of new ventures, what are dot-coms offering that your company may be overlooking? Are you talking about career development, or droning about employee retention? How can you "steal" from your own staff in other divisions to enrich and strengthen the technology operation? What kind of employee referral programs really work? We'll hear from both sides of the debate in this lively, provocative discussion hiring, head-hunting and holding onto the best IT people in a sizzling job market.

10:30am - 11:15am



Closing Keynote: "Putting All the Pieces Together: The E-Management Difference"
Peter Keen, Author, The eProcess Edge, and Chairman
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ponent, called the kernel, is optimized for speed. But the numerous other components are expected to honor a different set of constraints. There, interdependence among components is governed by strict principles of modularization that severely limit side effects that any activity might have on other activities. Speed is also important outside the kernel but has to be found within the architectural constraints that give primacy to crash resistance, thus lowering the chances of catastrophic consequences from exploration.

4 Problems that have looming disasters. This last factor favoring exploration is not a property of Linux open software development but rather of the motivation of some of the developers. Among those who have made major contributions to Linux are many who feared the extinction of the Unix operating system family, in which they

have invested their expertise. They also feared the rising hegemony of operating systems from Microsoft. For them, joining a relatively high-risk, exploration-maximizing software project may have been an attractive alternative to domination by what they often call "The Beast from Redmond."

Taken together, our four conditions show Linux to be a development project for which it is highly promising to strongly encourage variety. It does not follow that open availability of source code is a form of magic that will cause all software projects to prosper as Linux has. Indeed, our analysis suggests that in order for the decentralized generation of proposals to be effective for Linux, several other conditions were important. In particular, Linux development benefited from the ability to



identify specific problems, make accurate copies of the current system with only deliberately introduced changes, evaluate the effectiveness of proposed solutions, and centrally control the choice of which proposals are im-

plemented as changes in the standard version. It remains to be seen just how widely applicable the decentralized generation of alternatives can be. But open source software development clearly demonstrates that even very large and highly structured systems, like Linux, can benefit from the encouragement of variety. **CIO**

Robert Axelrod is a professor of political science and public policy at the University of Michigan. Michael D. Cohen is a professor of information and public policy, also at Michigan.



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Killer Viruses Hit the Internet

*A new crop of unnaturally born killers targets
networked computers* BY JOHN EDWARDS

*Edited by Christopher
Lindquist. Send your
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USA GROUP'S Hamed Omar remembers when it was relatively easy to protect enterprise computers against viruses. "In the early '90s, viruses spread from machine to machine by 'sneaker-net'—the manual exchange of files," says the

senior vice president of information technology at USA Group, a student loan guarantor. "Now, viruses can spread in a heartbeat via the internet as an e-mail attachment and can be a real problem to guard against and eliminate."

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Much like 486 processors and Windows 3.1, easily eradicated viruses have faded into history. As the third millennium dawns, new network-aware viruses possess the ability to wreak widespread and nearly instantaneous damage on internet-linked PCs and servers.

Hackers create next-generation viruses for just one purpose—destruction—says

code ordered the infected PC to respond automatically to incoming messages with an attached file that, when opened, deleted data in Microsoft Word, Excel, PowerPoint and other files. It was “purely evil,” says Bhavnani.

Jeffrey Baker, manager of system services at Melbourne, Fla.-based communications equipment manufacturer Harris

“Viruses are no longer simply the minor annoyances they were a few years ago. Now they can verge on the catastrophic.”

—Samir Bhavnani, research analyst, Computer Economics

Samir Bhavnani, a research analyst at Computer Economics, a Carlsbad, Calif.-based technology market research company. “Viruses are no longer simply the minor annoyances they were a few years ago. Now they can verge on the catastrophic.” Computer Economics estimates that virus attacks racked up more than \$12.1 billion in damages to businesses during 1999, including loss of productivity because of PC and network downtime. “Corporations cannot afford to play Russian roulette with professional virus writers,” says Bhavnani.

Return to Sender

A new virus threat materialized last year with the arrival of the Melissa and ExplorerZip viruses. Melissa surfaced in the spring, sneaking onto PCs as an e-mail message with an attached list of pornographic websites. When users opened the file, the virus would strike. When a user attempted to send from an infected machine any Word document as an e-mail attachment using Microsoft Outlook, the message would automatically send itself to the first 50 addresses in the client's address book—bogging down networks and servers with errant messages. ExplorerZip arrived a few weeks after Melissa and was even more destructive. This malicious

Corp., learned the hard way about the headaches a virus attack can inflict upon an organization. During last year's initial Melissa outbreak, he spent a very long weekend tending to Harris's crippled enterprise e-mail system.

Baker became aware of the virus attack one Friday evening as he was heading to dinner with several coworkers. “Our pagers went off, telling us that we had an important message from [virus scanner vendor] Network Associates,” he recalls. Once back at the office, Baker discovered that all 30 of Harris's mail servers had been victimized. “At its height, we had over 50,000 copies of the virus inside our Microsoft Exchange environment.” At the time, Harris had no virus protection installed on its e-mail servers, opting instead for less secure client-based solutions.

Baker and his team detached the servers from the internet and spent frantic hours installing new server-based virus scanners and clearing existing infected files. By Monday morning, he was able to reconnect the servers—and then he watched as thousands of Melissa-infected files tried, and failed, to enter the company's systems. “All in all, you could say it was a very challenging experience and a heck of an interesting weekend,” says Baker.

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Melissa and ExplorerZip, along with the other network-aware viruses that followed in their wake, were a wake-up call to the IT community, says Bhavnani. "Organizations started to realize the severity and the malicious intent of most computer viruses." But recognizing the threat and dealing with it in a sensible manner are two different things, says Charles Rutstein, a senior analyst in the e-business

year-olds sending out stuff." Computer Economics's Bhavnani agrees, "This form of economic terrorism is one of the easiest ways to disrupt a corporation."

Once you realize the danger, you need to act. A rapid response is essential to stopping network-aware viruses before they can inflict widespread damage, says Vincent Weafer, director of the Symantec AntiVirus Research Center in Santa Monica, Calif.

A rapid response is essential to stopping network-aware viruses before they can inflict widespread damage.

infrastructure group of Cambridge, Mass.-based Forrester Research. "Despite the increased awareness, most CIOs only act after there's been a widespread infection," Rutstein says. "Then they overcompensate by buying a tremendous amount of new software and support." The more intelligent approach, claims Rutstein, is to tackle the problem systematically. "To deal with viruses you must understand the threat, design a rapid response, integrate the response into your existing security infrastructure, train your staff and then hope for the best."

Know Your Enemy

The first step toward managing viruses is to understand the people who create and unleash them, says Narender Mangalam, director of security strategy for Islandia, N.Y.-based enterprise management software vendor Computer Associates International. He notes that many CIOs mistakenly believe that only attention-starved kids create viruses. Although not widely publicized, an increasing number of virus attacks have been traced back to sources ranging from competitors to disgruntled employees to international terrorists, says Mangalam. "You have a lot of situations where there is malice involved, and it's not merely 16-

"Vendors must quickly identify viruses, generate new updates and distribute them to customers," he says. "The customers, in turn, make sure that the updates are distributed across their networks."

Dodging the Bullet

USA Group's Omar says a rapid response strategy has helped his company avoid a major virus outbreak. The Indianapolis-based company has installed Computer Associates' Unicenter TNG Advanced AntiVirus Option on each of its PCs. Whenever a user signs onto a PC, the software automatically installs the latest antivirus codes, then seeks out and treats any suspicious files. But even that level of protection proved insufficient, says Omar. "An idle PC can receive an e-mail overnight, and until the user signs on, the virus can stay active in the system all night long." While the security gap didn't cause any major problems, the potential for a major virus outbreak worried Omar and his staff.

To secure the breach, USA Group implemented Computer Associates' Unicenter TNG Asset Management Option. The software allows Omar's staff to centrally manage files across all enterprise PCs. As soon as they discover a virus-contaminated file, staff members treat it uni-

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system provides security features, such as automatic encryption, tracking and delivery confirmation, and even a self-destruct mechanism that lets you destroy an already-sent message after a certain time or on command, should you fear the information might be compromised. The product ranges from a free "lite" version to a \$300 "commerce" edition capable of dealing with enterprise-size volumes of e-mail. For more information, visit www.1on1mail.com.

The Search Is Over

If customers can't find what they need on your website, they'll look elsewhere. But some search engine solutions can be difficult to implement, while others offer few features. **Searchbutton.com** in Mountain View, Calif., attempts to avoid both those problems. According to the company, **Searchbutton 2.0** lets you quickly integrate its search engine into your site with little or no programming. You can then customize the product's look and feel to match your site, view online activity reports to see what customers are looking for—and what they're not finding—and request reindexing on the fly to guarantee that visitors search the most current information. Pricing starts at \$39.95 a month. For more information, visit www.searchbutton.com or call 650 947-8310.



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Customer relationship management (CRM) has become the mantra for organizations that want to move past cost cutting measures to achieve growth, increase market share and build customer loyalty. The successful CRM initiative is implemented through a combination of business strategy and technology. This year's CIO 100 Award honorees share how they have developed an integrated view of their customers while achieving sustained competitive growth.

EXPLORE How to Create Innovative Environments

Mike Vance, chairman and co-founder of the Creative Thinking Association of America, provides methods for fostering creativity and originality in our organizations.

INVESTIGATE New Technologies

Geoff Moore, chairman and founder of The Chasm Group, is among the world's foremost high technology marketing gurus and was recently named one of the Elite 100 leading the digital revolution. A prolific author, his latest book, *Living on the Faultline: Managing for Shareholder Value in the Age of the Internet*, provides new models to help analyze and change current business practices to meet and surpass the challenges of the marketplace.

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DISCOVER What It Takes to Transition from CIO to CEO

Katherine Hudson is president and chief executive officer of Brady Corporation, a \$471M international manufacturer of identification and material

solution products. Prior to Brady Corporation, Hudson was CIO of Kodak. Named one of 12 most influential CIOs of the decade and inducted in the CIO Hall of Fame in 1997, Hudson shares what it takes to move from CIO to CEO.



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- Maximizing the Customer Relationship
- Leadership: New Economy, New Challenges

Participants are urged to bring ideas, questions, concerns and actual examples into the sessions.

LEARN How American Airlines Soars to Meet its Customers' Needs

American Airlines has been a pioneer in utilizing technology to effectively meet its customers' needs. Scott Nason, VP & CIO and John Samuel, VP of Interactive Marketing share how they continually personalize their services to satisfy customers and increase revenues.

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Over 400 CIOs, CEOs and senior executives will gather at this year's CIO 100 Symposium to discuss the latest strategic business and technology issues.

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UNCOVER Internet Security Strategies

John Puckett, co-chairman of the Private Sector Council in Washington D.C. and Chief Technology and Information Officer of toymart.com, addresses security threats. Are they real? What measures can be taken to achieve an acceptable level of security? Puckett also outlines how security plans and policies can be developed.

JOIN Us for an Evening of Elegance

All participants are invited to attend a special black tie reception, dinner and awards ceremony on Tuesday evening recognizing this year's CIO 100 Award honorees. The "Oscars" of the IT industry, the event features champagne, a six-course gourmet dinner, and presentation of the CIO 100 Award to all honorees.

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versally or quickly delete it from every company PC. "Even though we cannot protect ourselves 100 percent from being affected, we have a very quick resolution time," says Omar.

Room for Improvement

As viruses become more sophisticated, CIOs need to view their protection strategies as coordinated network security efforts. Sarah Gordon, an IBM Research data security analyst, recommends deploying an integrated solution that involves installing antivirus software on all enterprise platforms, including servers, desktops and key access points such as internet gateways. "You also need intrusions-detection software to ensure that once there is an intrusion you can stop it," she says.

New tools aren't the only approach, however. Strengthened staff training can also help reduce the risk of a virus outbreak. Simple things, such as not downloading unnecessary files from the internet, not opening executable files sent via e-mail and not frequenting pornographic and other shady websites, can greatly reduce an organization's virus exposure, says Computer Economics' Bhavnani.

Magic Denied

A day may come when viruses are virtually unknown, thanks to widespread, high-quality security systems. Computer Associates' Mangalam says he hopes that a standards-based approach to virus security, in which the internet's core structure contains basic safeguards, could make life more difficult, if not impossible, for virus authors. But CIOs hoping for the imminent arrival of such a magic bullet are setting themselves up for disappointment. "Right now, air-tight security combined with nonstop vigilance offers the best—and really the only—protection," Mangalam warns. **CIO**

John Edwards is a freelance technology writer based in Gilbert, Ariz. He can be reached at jedwards@john-edwards.com.



REVISIT
POS scanners

Scanners Get Personal

Point-of-sale systems do more than just track inventory

BY FRED HAPGOOD

THE GOLD STANDARD for personalized marketing was set a hundred years ago. Back then a storekeeper knew his stock by heart, kept all his prices in his head and could direct a customer's attention in real-time across a succession of products while talking with the person about his children, the weather and the harvest. As new retail models have steadily taken us further from these old-time storekeepers, vendors have looked back and wished they could reestablish that intimate connection with their customers.

In the mid-1980s, several companies claimed that they could recapture a bit of this relationship using point-of-sale (POS) scanner data. POS scanners were nothing new, but most companies had used the devices simply for pricing and inventory control. The vendors claimed they could do much more, such as exploiting the scanner data to track product sales and market share, identify trends and evaluate mar-

keting campaigns. Although the process didn't promise to bring back the old days, it certainly was a step in the right direction.

In November 1990 we ran an article evaluating the technology. The story was generally positive, agreeing that POS data had a long list of potential applications. But there was a shadow over the concept: In retail environments, POS scanners could generate astronomical amounts of data—a million new records per day or more. Moving, storing and processing this huge volume demanded technology unavailable to most companies. (The title of the article, "Drowning in Data," reflected that concern.)

As a result, vendors pruned back the applications. They transmitted data in summary form, for instance—though analysis still took days to complete. Designers were also unable to combine data streams or add extra computational routines, such

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as better error checking. The consequence, according to Frank Malta of IBM's Business Intelligence Services, was that for all their promise, the return on investment for these systems was marginal in practice.

During the last 10 years, however, the tide of computational power, called Moore's Law (which, roughly translated, states that computing power will double every 12 to 18 months), rose until it lifted even the worst POS resource hogs out of the mud. About two or three years ago, recalls Malcolm Fowler, vice president at Ernex Marketing Technologies, POS scanner data applications crossed a subtle

club-card number as well as data from websites, kiosks or call-in centers. The latest products also permit much more elaborate forms of analysis. IBM's Malta claims that that company now uses artificial learning and reasoning algorithms, such as neural nets and genetic algorithms, to process POS data.

Bigger hard disks let users store the raw data without averaging or aggregating it, which allows data mining down to the customer level. "We can ask questions like 'Tell me the preferred colors of our top 10 customers,'" says Tom Camps, vice president of market strate-

Technology can now look for products missing from one order that tend to appear in other, similar orders: milk, eggs and cereal, but no bacon, for instance. The seller can immediately remind the customer about the missing item.

point of viability, and a wave of products appeared to try to deliver on the potential of earlier claims.

Ernex, for instance, routinely builds systems that can manipulate POS data quickly enough to calculate unique promotions while customers wait to have their orders rung up. For example, the technology can now look for products missing from one order that tend to appear in other, similar orders: milk, eggs and cereal, but no bacon, for instance. (The process is called "basket analysis," for obvious reasons.) On the assumption that all these items belong together, the seller can immediately remind the customer about the missing item ("How about some bacon?") and perhaps even offer a special price—all calculated on the spot.

Faster processors also allow POS data to integrate with other data streams, such as purchase history based on a customer

gies at Cognos, a manufacturer of business intelligence tools. "Or show me all the people who buy the same things as this specific person." Meanwhile, faster networks can push the data into more departments and to more business partners, such as suppliers.

In some cases this data even doubles back and revisits its origin: the customer. Image Info Software, based in New York City, sells POS analysis tools to clothing designer showrooms. According to Craig Schlossberg, vice president of software at Image Info, buyers need to customize their orders on such measures as styles, colors, fabrics, top/bottom and woven/knit ratios. Image Info aggregates POS data from several dozen showrooms so that the company's clients can see exactly what they—and their competitors—are buying.

It's enough to make even that old-time storekeeper jealous. ■

new products

Fast Firewall

Gigabit ethernet holds tremendous promise—the promise that valuable corporate data could be stolen from your company faster than ever if you don't have the proper security systems in place. To fill the void, **NetScreen**

Technologies recently introduced the **NetScreen-1000 Gigabit**

Security System. The device supports a variety of security features, including stateful packet inspection, TCP/IP header parsing and network address translation, as well as providing for gigabit virtual private networking (VPN). According to the company, a fully configured system can handle 500,000 concurrent sessions and 25,000 IPsec tunnels. **NetScreen-1000** pricing starts at \$109,000.

For more information, visit www.netscreen.com or call 408 330-7800.

Move Your Mail

Buried in e-mail? You're not alone. Mail servers come under more strain today than ever before. Part of the problem is attachments. Business-related or not, millions of messages flow across the internet weighed down with pictures, documents, programs, music files and more. Often, these attachments are dozens of times larger than the message that contains them—bulky fodder to fill

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Household Income	\$45,000
Current Services	Gold Member Status On-Line Reservations Log-in
Usage Profile	Airline Preference: UAL Aisle, Vegetarian Meal Rental Car Preference: ALM 2-door, something fast Hotel Preference: HLTN King-size, single Non-Smoker Business Traveler 72% of travel over 1000 miles Continent US traveler only Vacations in Chicago to see family
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E-Commerce Software Explosion

GET READY to open your wallet. According to a recent Forrester Research report, spending on e-commerce software will jump from just over \$3 billion in 1999 to more than \$14.5 billion in 2003.

The reason? Rapidly increasing pressure to quickly become players in the "e-conomy" will force companies to seek out prepackaged solutions rather than take the time and effort to code their own software. The buying boom won't take long to ramp up either. According to the report by Analyst Eric Schmitt, IT spending on e-commerce software will increase by 72 percent this year alone as companies devote a larger part of their IT budgets to software licensing.

E-commerce software providers who want to dip into that new money may need to change their ways of doing business, however. According to Forrester, many users complain that current products are difficult to integrate or fail to properly follow standards. To remedy the situation, Forrester predicts that software vendors will divide into two types: those who create open-standards-based platforms and those who offer components that integrate into those platforms.

This new model will also help IT executives shift their focus from simply getting sites up quickly, to creating long-term, maintainable sites with enough built-in flexibility to adapt to changing requirements—a critical feature in the still-nascent internet market.

—Christopher Lindquist



new products

server disks. Mountain View, Calif.-based **Veritas Software's** new product, **Remote Storage for Microsoft Exchange**—when used in conjunction with the company's **Backup Exec** archiving tool—can automatically move aging attachments to another storage device, such as a tape drive, while still providing users with access to the files. Pricing starts at \$4,995 for existing Backup Exec users. For more information, visit www.veritas.com or call 650 335-8000.

In the Cards

PC card readers for desktop computers are nothing new, but many of the devices are single-slot, external units optimized for reading images from a digital camera. Sunnyvale, Calif.-based **Actiontec Technologies' PC750 Card Reader** offers more flexibility. The device mounts in a 3.5-inch drive bay and connects to your system via a PCI card, ensuring faster transfer rates than external readers typically do. The dual-slot drive supports PCMCIA Type I, II and III cards, letting you use hard disk drives, Flash memory cards, security cards and more. You can also add and remove cards without having to shut down or reboot the system. The reader retails for \$149.95. For more information, visit www.actiontec.com or call 800 797-7001.

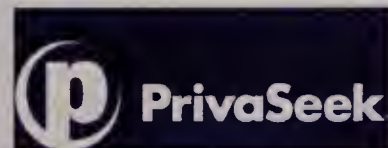
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UNDER DEVELOPMENT
flat-panel screens

Pint-Size Power Supplies

LAPTOPS, PDAs and other portable computers continue to get thinner and lighter, but a new twist on old technology may soon give them a chance to slim down even more.

The electromechanical transformers that currently power flat-panel displays are big and heavy, says Kenji Uchino, a professor of electrical engineering and materials at Penn State University and a member of the school's materials research laboratory. The devices use a pair of bulky wire coils to increase low battery voltages to the higher levels required by the screens.

Those coils add weight and size to portables, but that's not the only problem: The units also produce magnetic fields that, without shielding, would wipe the data off floppy disks and hard drives.

Uchino hopes that vendors will eventually replace these electronic monsters with a new type of thumbnail-size ceramic piezoelectric transformer (about one-tenth the size and weight of traditional transformers) that he recently developed with fellow Penn State researchers.

Transformers are critical for portables because their flat-panel screens require

more energy than any other component. While most portable computers run on 12-volt batteries, a transformer must produce 500 volts to turn on a screen's backlight and then maintain a steady 250 to 300 volts to keep it lit.

In the past, however, attempts at shrinking transformers also reduced their efficiency. But even very small piezoelectric transformers, which use oscillating ceramic crystals to step up voltage, can operate at full efficiency. The new transformers offer more than a 90 percent boost in efficiency, along with higher reliability and no need for shielding, compared to electromagnetic transformers.

Uchino's circular device also marks an improvement over rectangular piezoelectric transformers, which were widely used in color TVs until they were abandoned several years ago because of excessive heat generation and physical fragility problems. Uchino's version generates no heat and is much more durable: Its disklike shape resists fracturing at major stress points.

"Piezoelectric transformers are not only more efficient, smaller and lighter, but they are also much less expensive to manufacture than conventional coil-wound transformers," says Uchino. The new transformer will sell for about 10 to 40 cents, although required support circuitry will drive the total manufacturing cost to approximately \$1 to \$3. Regardless, that's a bargain compared with electromagnetic transformers, which typically cost more than twice as much to make.

Penn State is looking to license the technology to component vendors that supply manufacturers of notebook PCs and other flat-panel-equipped devices. According to Uchino, the transformers could go into production shortly after any deal occurs. *—John Edwards*

The new transformers offer more than a 90 percent boost in efficiency compared to electromagnetic transformers.



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Difference Engine

The Social Impact of Technology

Private Matters

Could your organization's privacy practices stand the scrutiny of a newspaper exposé?

BY SIMSON L. GARFINKEL

A BIOMEDICAL STARTUP working on an improved fertility test orders a hundred vials of human female blood from a fertility lab. Each vial comes labeled with the fertility analysis—and, unexpectedly, with the name of the woman who gave the blood. Essentially, it's a list of women who are trying to become pregnant, and the list includes two very high-profile names. It's a huge violation of medical privacy, one that's the result of a simple oversight at the testing lab.

A husband-and-wife team is arrested for credit fraud. In their house, investigators find countless credit cards embossed with other people's names. The couple is charged with identity theft and accused of charging more than \$50,000 worth



of merchandise to other people's accounts. No blame falls on the credit card companies that eagerly opened the fraudulent accounts without properly verifying the couple's true identity.

A computer enthusiast buys a pair of used PCs from a computer store. On the first are three years' worth of legal records from a local law firm. The second includes a family's financial records, college application essays and five years' worth of a woman's diary.

ILLUSTRATION BY DAVID GOLDIN

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These days it's hard to pick up a newspaper and not read an article about the ways computers are being used to triangulate our lives and attack our privacy. In January, the *New York Post* described how that city's police department is using subway cards as a way of tracking the movements of criminal suspects. *USA Today*, meanwhile, detailed DoubleClick's decision to combine anonymous web surfing profiles with individual names and addresses—a decision that DoubleClick reversed only after tremendous public outcry.

Americans are increasingly angered by the seeming inability of business and government to respect their perceived privacy rights. Indeed, a recent BusinessWeek/Harris poll found that

mation from EU member countries to jurisdictions where that information is not treated with respect by law—jurisdictions such as the United States. (U.S. negotiators are working with the Europeans to find some way around the EU regulations but no formal agreement is in place.)

Although the United States has many laws on the books that speak to the issue of privacy—one that gives Americans the legal right to see their credit records, for example, and another that prohibits video rental stores from releasing the names of the movies that you rent—the country lacks an overall scheme for dealing with the issues of data privacy. Until such legislation is drafted and passed, American businesses operate in an uncertain environment. Like chemical factories in the 1960s that poisoned rivers but violated no laws, today many businesses would earn the public's ire if an enterprising reporter were to merely detail their handling of personal information.

Many privacy violations are simply the result of careless information handling or policies.

57 percent of Americans believe “the government should pass laws now for how personal information can be collected and used on the internet.” But as the three previous examples show, privacy snafus aren't always the result of an organization deciding to violate our privacy for fun and profit—nor are the problems confined to the internet. Instead, many privacy violations are simply the result of careless information handling or policies.

Poor practices for handling personal information have long been a problem for American businesses and government. One of the reasons is that they have little formal guidance or experts to whom they can turn to when it comes to techniques for properly safeguarding privacy. That's not the case in other countries, however. For example, after the Public Library of Vancouver installed 30 closed-circuit surveillance cameras to deter theft and vandalism, the privacy commissioner of British Columbia made an inspection of the premises. The commissioner then issued a report that showed how the cameras could be altered to do a better job of stopping theft while simultaneously having less impact on personal privacy—for example, by notifying the public that the cameras existed, rather than keeping their presence secret. (Details of the report can be found at www.oipcbc.org/investigations/reports/invrpt12.html.)

But unlike our counterparts in Canada, Europe, Australia and even Hong Kong, Americans lack both the legislation that would establish minimal privacy standards and a regulatory agency that could advise businesses on acceptable privacy practices. The lack of such structures is increasingly causing problems for American companies that do business abroad, thanks to the European Union's Data Protection Directive, which prohibits companies from transferring personally identifiable infor-

So what's an upstanding corporation to do? The best way to address these questions is by consistently applying the Code of Fair Information Practices and the 1980 OECD privacy guidelines (see www.databasenation.com for more on the guidelines). Make sure that your organization collects only the personal information that is necessary to deliver your product or service—and make sure that the information is carefully protected, accessible only to those with a need to know. Provide a means for consumers to view their own files and correct incorrect information. If you intend to use customer information for research or marketing, be sure to inform your customers of this intention, and give them a way of opting out of your plans.

Another good strategy is to make someone within your organization responsible for privacy issues. Most European companies are legally required to have such an individual, but few American companies do. That person should have a mandate to analyze and change business practices, if necessary. Their position should be akin to a director of security, since security and privacy go hand in hand.

Ultimately, privacy protection is much more than simply another feel-good public relations move. One of the most valuable assets that organizations have is the trust of their customers and constituents. Being cavalier about privacy is one of the most effective ways for an organization to tell the public to buzz off and go elsewhere. **CIO**

Do you think privacy matters? Let us know at difference@cio.com. Simson Garfinkel is the author of *Database Nation: The Death of Privacy in the 21st Century* (O'Reilly & Assoc., 2000).





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Why Are We Protecting the Software Industry?

BY MARTHA HELLER

SOFTWARE VENDORS in Virginia must love their legislature. On Feb. 29, 2000, the state's General Assembly gave final approval to the Uniform Computer Information Transaction Act (UCITA), which Gov. Jim Gilmore, a staunch supporter of the high-tech industry, then gave his blessing.

UCITA was designed to provide uniformity to the myriad laws in different states that now govern the sale and licensing of software products. Opponents of the Act, which run the gamut from consumer advocacy groups to businesses that buy large amounts of software, worry that in addition to making contracts uniform, the legislation will give software publishers greater legal clout to enforce their "shrink-wrap" licenses, licenses that are so broad and unabashedly protective that many courts have failed to support them. One condition of some agreements, for example, forbids a software user from publishing a negative review of the product, regardless of the product's shortcomings. Another condition prohibits a company that is acquired by or merges with another company to transfer the software to the new corporate entity. Under UCITA, critics claim, vendors that believe their customers have



failed to follow these and other conditions, will have legal recourse to enter their customers' computers and literally shut them down.

Predictably, software manufacturers like Microsoft and AOL, and high-tech lobbyists like the Business Software Alliance, have been pushing hard for UCITA, arguing that if the software industry is going to continue to develop at the pace it has, manufacturers need to maintain certain controls.

The software industry, UCITA's supporters imply, needs protection from those consumers who want to use software without paying for it, copy and distribute it to their colleagues, and write unfair and negative product reviews.

Who are they trying to kid? Software may already be the single most powerful industry since Big Oil was made slightly less big three decades ago. According to a 1999 study conducted by the BSA, since 1994, software sales have grown

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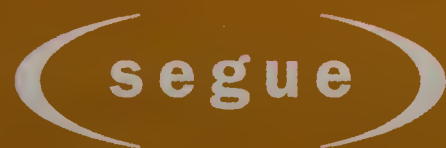
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15.4 percent a year, while the gross domestic product has grown at a rate of only 5.4 percent. The study predicted that by the end of 2000, the software industry's contribution to the U.S. economy would be greater than the contribution of any other manufacturing industry. In 1997, the average salary for employees in software companies was \$69,000, more than twice that of employees in any other private industry.

The fact is, software is so big and so powerful that it can make or break a state's economy, and politicians know it. If AOL, displeased with Virginia's high-tech policy, were to high-tail it to Maryland, Virginia's economy would suffer. State legislatures are protecting software companies to protect themselves, not out of a concern over the software industry.

Do software companies need protection?

Want to sound off on this or other topics? Join the ongoing debates at comment.cio.com.

We know why politicians are passing legislation that protects software companies at the expense of individual and business end users. But we don't have to support them in doing it. This thread began on March 1, 2000, and here is a sampling of the responses that Senior Web Editor Martha Heller received. You can respond to her by e-mail at mbheller@cio.com or via the web at comment.cio.com.

THE SOFTWARE COMPANIES AS A WHOLE NEED TO BE HELD accountable for the code they are selling—before any protections should be granted. I would guess that hundreds of millions of dollars are spent each year to fix or replace poorly written and bug-ridden software packages. It astounds me the level at which we, the consumer, put up with bugs, patches, versions and upgrades. I would like the software companies to be required to recall their software if a certain percentage of customers are negatively affected by its installation.

Bret Richardson

IT Manager

Jore Corp.

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I DO NOT THINK YOU ARE ASKING THE RIGHT QUESTION. The question should be, Why are we passing legislation that circumvents free-market action? The software industry can be controlled by the action of the free market. When the software market tried to use widespread software protection devices and utilities, the marketplace stopped buying software from

those companies that used them. In this case, the same thing will happen.

Paul Lohnes

Senior Consultant

ITC

phl99@ix.netcom.com

PIRACY AND ABUSE WILL NO MORE STIFLE THE SOFTWARE industry than it will stifle the music, movie or book publishing industries—all of which have the exact same problem with unauthorized copying and copyright violation. Make no mistake: Software is no different from an electronic copy of a cookbook. The reason UCITA is protecting software is that, in a democracy, government goes where it's pushed, and software companies can afford to push constantly; and it is because they are rich that they can get protection. For the historians out there, see the Louis B. Mayer (MGM) income tax case. Congress passed a law just for him, lowering his, and only his, personal income taxes!

Software encryption will much more effectively protect software than any law, since pirates will violate whatever law there is anyway. The big issue to me is that even today software comes with a disclaimer instead of a warranty (note: the media are guaranteed, the code is not!) and under UCITA the user has even fewer grounds to sue or complain if the software is just a lot of expensive gobbledygook code that hardly works.

It is up to the users of software to stop UCITA in their home state legislatures and to stop accepting junk software.

David P. Vernon

Consultant

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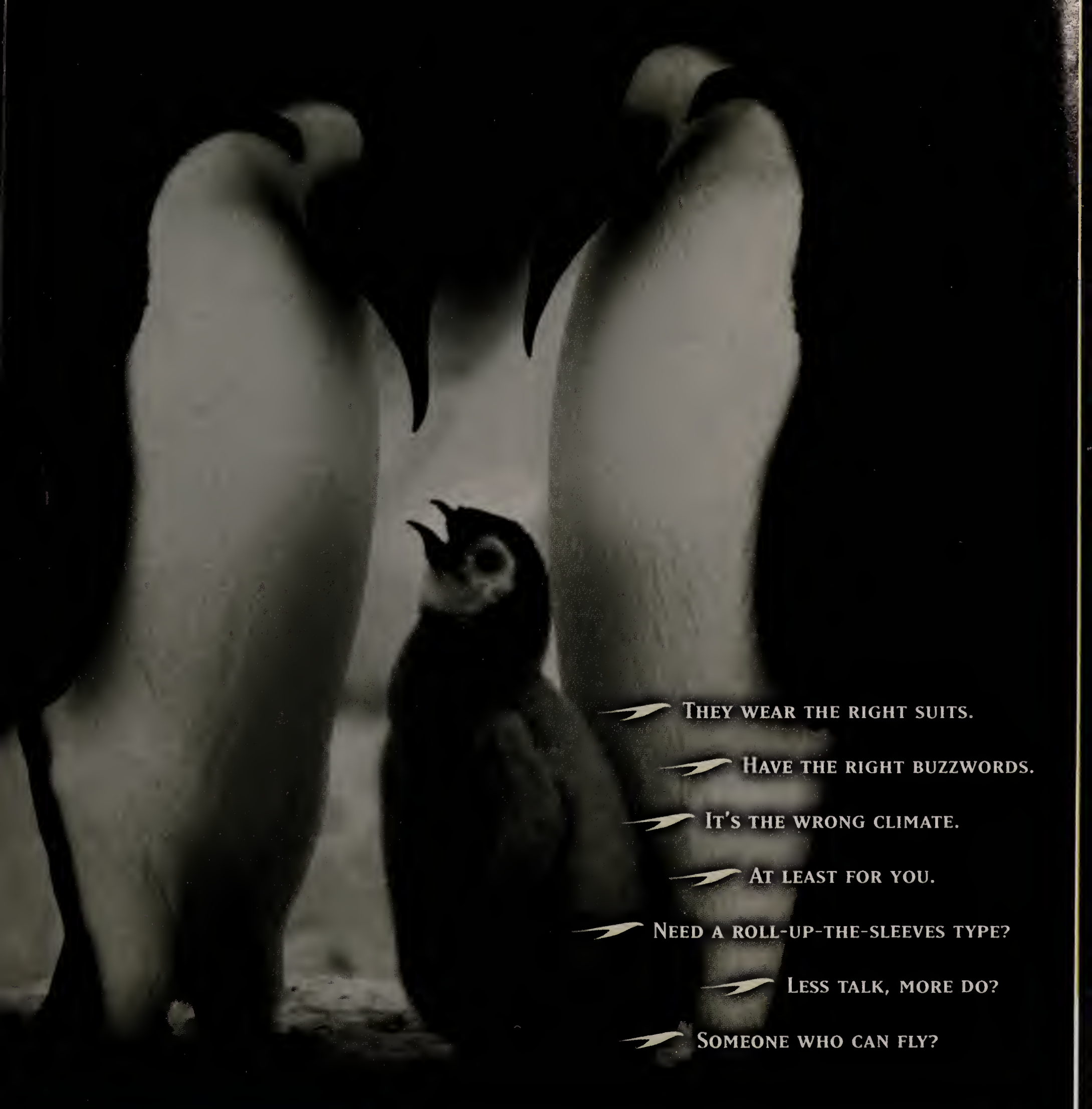
MY COMPANY HAS MADE EVERY EFFORT TO REMAIN "pirate free" and has invested more than \$1 million in software that works—for the most part. The fact is software is the work of people and therefore subject to human frailty and the desperate focus of the software company's management.

When all is said and done, there is good software and bad software marketed under the banner of "Universal Cure-All." The marketing efforts of software companies extend far beyond the functionality and reliability of their products. As purchasers, we rely on the claims of the manufacturer. My business law memories would have the manufacturer—not the purchaser—responsible for functionality claims. Libel is only libel if the statements are untrue. When you buy a license it's yours. Putting caveats on the sale or transfer of a license is nonsense.

Albert T. Kruzel

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Meeting of the Minds

BY TOM MURPHY

IN THIS FAST-PACED world in which technology executives are supposed to make wise and lasting decisions for the good of our customers and shareholders, we must use every means available to ensure our companies' success. We are under pressure from many different angles, from recruiting and retention to keeping up with changing technologies. One means that I have used to help in this daily battle is vendor review sessions.

The cruise industry is a small one by any relative standard, and there are many complexities that go along with operating the shoreside and shipboard environments. The better our vendors understand our business and the environment we operate in, the better they are at shaping solutions for us.

If you are like me, your vendors fit one of three general categories: one, close enough to be considered a friend; two, a necessary evil; or three, scum of the earth. Regardless of which category they fall into, vendors are important allies in my quest to stay up to speed and to influence the direction of technology. I have always made it a point to treat my vendors with respect, to be honest and candid, and to dissuade them from quixotic attempts to win my business when it is not possible.

I visit vendor sites when my schedule allows to see current and future developments, and I encourage my staff to do the same.

Several months ago I started holding vendor review sessions, and this has had a dramatic effect on the relationship between my company and my vendors. The days are two-way information sharing opportunities. I ask that the vendors refrain from sales pitches and concentrate instead on understanding my business and my company's technology needs. The first part of the day is spent reviewing my company's six- and 12-month challenges, and then we talk about the strategic vision for the next 36 months. Our discussions focus as much on business issues as on technology. We then turn the floor over to the vendor. The vendor is encouraged to focus the presentation based on what has been discussed in the morning. The benefit? Virtual elimination of prepared, canned presentations.

I invite everyone in IT to attend the sessions, and the attendees vary based on the vendor. We prepare by outlining the key issues and strategies and e-mailing them to the vendors ahead of time. I tell the vendors who will be in the audience and encourage them to bring the right people. The sales guy is always going to show up. That's fine. But the right engineer, the right technologist, the right strategist must also be present. This is not a glad-handing session. I don't care about the titles of the people who show up on the vendor side, as long as they are able to communicate and participate actively and effectively.

I avoid the temptation to put competitive vendors on stage together, regardless of the fun such a fireworks display would be. I do select complementary vendors and vendors that have alliances or partnerships to participate together. This adds to the brainstorming attributes of the meetings.

So far, we've had five of these meetings and are averaging one a month. We hope to make them more frequent but time constraints make that difficult. Does it always work flawlessly? Of course not. But it works well most of the time, and as my key vendors adapt to this way of working cooperatively they get better at the process. The ones that don't get it and keep trying to sell are simply stopped and the meeting is adjourned. One time and they usually get the message. Two times and the vendor does not get another chance. I've yet to have one make the mistake twice. **CIO**

Looking for a platform for your ideas? Let us know at platform@cio.com. Tom Murphy is CIO of Royal Caribbean Cruises in Miami.



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Too much access to information can make even the sanest person a little twitchy

BY MEGAN SANTOSUS

THE INTERNET has garnered a lot of ink for its ability to empower the lowly individual. Whether it's haggling for the best price on a 2000 BMW Z3 or hunting down a first edition of *The Grapes of Wrath*, the internet can put people smack in the middle of transactions that were formerly handled by specialized professionals.

But there's a downside to this newfound power. Now that we have the ability to check stock portfolios, monitor every caprice of online auctions and get up-to-the-minute sports scores, many of us are becoming obsessive control freaks. We agonize over every blip in the market, compulsively check eBay to make sure we're not missing out on a good deal and furtively monitor the goings-on at Mercata in the hope of saving a few bucks. We may indeed be more informed and enjoy more power in transactions, but at the same time we're losing control of our lives.

The result is frustration, anxiety, even a sense of nagging despair. I know. I've experienced these feelings firsthand. There was a time not too long ago when I was satisfied with the monthly statements I received from my investment company.



Although the information was already a week out of date by the time the statements appeared in my mailbox, I didn't care. I knew I could check the value of my account daily by using a Touch-Tone service, but I didn't indulge myself much. The periodic statements seemed to reinforce the idea of investing for the long haul. I filed them away in loose-leaf folders that slowly took over a shelf in a bookcase.

Then came the internet. My investment company—let's call it Loyalty Investments—set up a website featuring online trades, daily closing prices and more fundamental information than even Warren Buffet could want. I created a portfolio page that kept a running total of my gains and losses for both my mutual fund investments and individual stocks I own. (When I upgraded to a new version of Netscape, I was delighted to see the gains and losses appear in green and red, respectively.) Although I was still in the market long-term, I

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experienced a visceral thrill checking my net worth a couple of times a day.

It wasn't long before the couple of times a day became more and more frequent. On particularly volatile trading days (and we know how often those occur lately), I'd keep my portfolio page on my screen and hit the reload button every half hour or so. If I saw too much red, I'd walk glumly around the office in a semi-catatonic state as if I had just squandered my life savings playing the slots at Foxwoods Casino. If a whole lot of green appeared, I'd entertain thoughts of quitting my job to spend my days trying to get my golf handicap significantly below my age.

In the end, the up-to-the-minute information is useless if we can't act on it when we want to.

Keeping one eye always on the stock market started to taint me. When a colleague attended a conference where Alan Greenspan was speaking, I didn't tell her to have a good time and come back with lots of story ideas. In an e-mail tinged with desperation, I begged her to call me ASAP if the Fed Chief made even the slightest hint about raising rates.

And this bipolar behavior flourished during a time when I had no intention of selling anything.

When I did decide to sell about 25 percent of my holdings for a down payment on a house, any semblance of emotional stability I had quickly evaporated. I waited until the end of January to make my move, so the IRS wouldn't ambush me with a hefty capital gains tax bill. I checked my portfolio more than a dozen times a day for two weeks or so, then I determined the time had come. It wasn't as if Jupiter finally aligned with Mars; I just couldn't take watching the market fluctuate any longer.

Other people must have had the same response. By 11 a.m. on the day in question, the Dow Jones was well on its way to posting a three-digit upswing. I dialed Loyalty's 800-number to make a quick trade using the Touch-Tone system, and I was absolutely flabbergasted. I couldn't access the system to make a trade, and following a cursory message to try the website, I was summarily disconnected. But with the collective pulse of greed sweeping individual investors looking to cash in on the market's latest mood swing, I couldn't trade online either. The sense of panic I felt was enough to make the thought of lunch out of the question. I sold the next day, when—true to form—the market gave back its gains.

So much for the power of the individual. Instead of feeling in

control, I felt lost, overwhelmed and more than a tad depressed. I'm not alone in feeling disenfranchised. As we all become accustomed to incessantly keeping up with the vagaries of the stock market, auction sites or any other internet venue where information changes by the second, we invariably feel as if the very ground is shifting beneath our feet. In the end, the up-to-the-minute information is useless if we can't act on it when we want to.

The obsession with staying informed isn't just bad for individuals' psyches. It's bad for the companies that inevitably can't satisfy our quest for instant gratification. The day after my trading effort was thwarted, I got a solicitation in the regular mail from my investment company. On the envelope was the marketers' question: "What do 134,248 Loyalty investors have in common?" My sardonic answer: They all must be trying to access the Touch-Tone trading system at the same time.

Needless to say, the whole experience didn't instill any confidence that Loyalty cared about me as a customer and was willing to deliver on its promise to instant access. While companies have always made gaffes, now they commit them on the internet in full view of customers who can have emotional, even irrational reactions. If I were speaking to a Loyalty broker who couldn't execute a trade on my behalf in a timely manner, I might still be angry, but I wouldn't feel despondent. But because the technical tools promised to me wouldn't allow me to make the trade I wanted when I wanted, my ensuing sense of powerlessness made me a prime candidate for therapy.

As companies rush to offer services via the internet, they should be prepared to deal with the psychological ramifications of the medium. Customers will become enthralled with the self-service model and come to depend on the internet as if it were a lifeline.

As for me, I've made significant progress since January. I no longer check my stocks daily, I log on to the local news site only once each morning, and I never check my favorite online bookstore for current sales. I suppose I'm one of the lucky ones, because I've come to terms with my limitations as far as the internet goes.

I no longer have to know about things simply because they're a click away. I learned from personal experience that sometimes ignorance can be bliss. Or at least good for your mental health. **CIO**

Although she no longer checks her inbox 50 times a day, you can e-mail Senior Editor Megan Santosus at santosus@cio.com.



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Opinion | From the Publisher

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Reading Is Fundamental



Gary J. Beach

THERE'S A LOT of talk about the old economy, the new economy, the knowledge economy, the digital economy.

And to this list I would like to add another: the people economy. Because what all economies are based on is people. People who make stuff and people who buy stuff. Nothing more. Nothing less.

The importance of people was made abundantly clear at the recent CIO Perspectives Conference I attended in Naples, Fla. Yes, business alignment with technology is still key, but to implement that alignment CIOs need people. And right now major corporations in America continue to face a huge IT job opening gap.

According to the CIO KnowPulse poll conducted at the conference, 12 percent to 15 percent of IT jobs in America are unfilled. This number is in line with the recent Information Technology Association of America's report that claims one in every 12 IT jobs is vacant. Incredibly, the association further reports, 846,328 of the 1.6 million new IT jobs will likely go unfilled in the coming 12 months. That's 50 percent, folks. How long can this go on without dramatically impacting our economy or, more immediate, your business? The people gap is not new. We've known about it for three years. But what is our industry doing about it?

Congress is giving lip service by raising the cap on H-1B visas, a program that allows foreign national workers to reside in the United States. Allowing 200,000 foreign IT workers into America each year solves nothing. The program

is shortsighted and is akin to putting a Band-Aid on a cut that needs stitches. Moreover, it doesn't address the root cause of the IT skills gap: The education system in our country is out of sync with producing skilled technology workers.

The higher education system desperately needs more adjunct professors like the readers of *CIO* to immediately improve the quality of IT education at the college and graduate level. But that too is a tactical, short-term remedy.

What we really need is systemic change in how we educate Americans. There has been a lot of talk lately about the "digital divide," the invisible wall separating the computer haves from the computer have-nots. Yes, there is a divide in America, but it has nothing to do with one's ability to compute; in reality, it has everything to do with one's education level.

Study after study shows the higher the level of education people achieve, the more likely they will have the technology skills needed in the workplace. I recently had the opportunity to listen to U.S. Secretary of the Treasury Lawrence Summers speak on the new economy. He claimed literacy was job No. 1.

I think he is right. If CIOs really want to pitch in and help alleviate the IT skills shortage over the long term, they would be wise to look around and suggest ways their companies can help more Americans discover the power of reading.

The people economy in America, and the IT skills shortage issue, would be better served if we collectively taught 200,000 Americans to read each year rather than importing 200,000 foreign nationals.

Do you have ideas on what we should do? Send e-mail to gbeach@cio.com.

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Interview

BY CHERYL BENTSEN

JOSÉ-MARIE Griffiths

José-Marie Griffiths is CIO for the University of Michigan and a professor in the graduate School of Information, where students prepare for careers as webmasters, CIOs, librarians, information economists, digital preservationists, consultants and software engineers. The British-born Griffiths has tackled IT projects for the U.S. Department of Energy, the IRS, Unesco, the National Science Foundation, the National Institutes of Health, Lucent Technologies' Bell Labs and the British Library.

CIO: The School of Information replaced traditional library studies. What is the librarian's role in the digital age?

GRIFFITHS: Library science has changed dramatically, but the core role of the librarian—evaluating knowledge resources—remains unchanged. People assume that since we have the web, everybody can do it all themselves. But most professionals don't have the time. The web is not a library. Most people have no idea how search engines work and don't know anything about the quality or integrity of the information they are accessing.

What are the demands of being both a CIO and a professor?

People say, somewhat jokingly, that I have the worst job here. As CIO you can never satisfy the various constituencies you serve because the minute you give them what they want, they want more. My academic background is a particular strength in the role of CIO in an academic institution. Some CIOs who come up through the technical ranks have difficulty at the highest level because they have never had an overview of the whole business. Having been a faculty member, a dean and an academic administrator, I can see the academic institution from all perspectives. I teach because I love it—teaching keeps me on my toes. By teaching I am able to get out with the students and touch base with other faculty and hear what they are all doing. It is such a good reminder of why I

am trying to do what I am doing as an administrator.

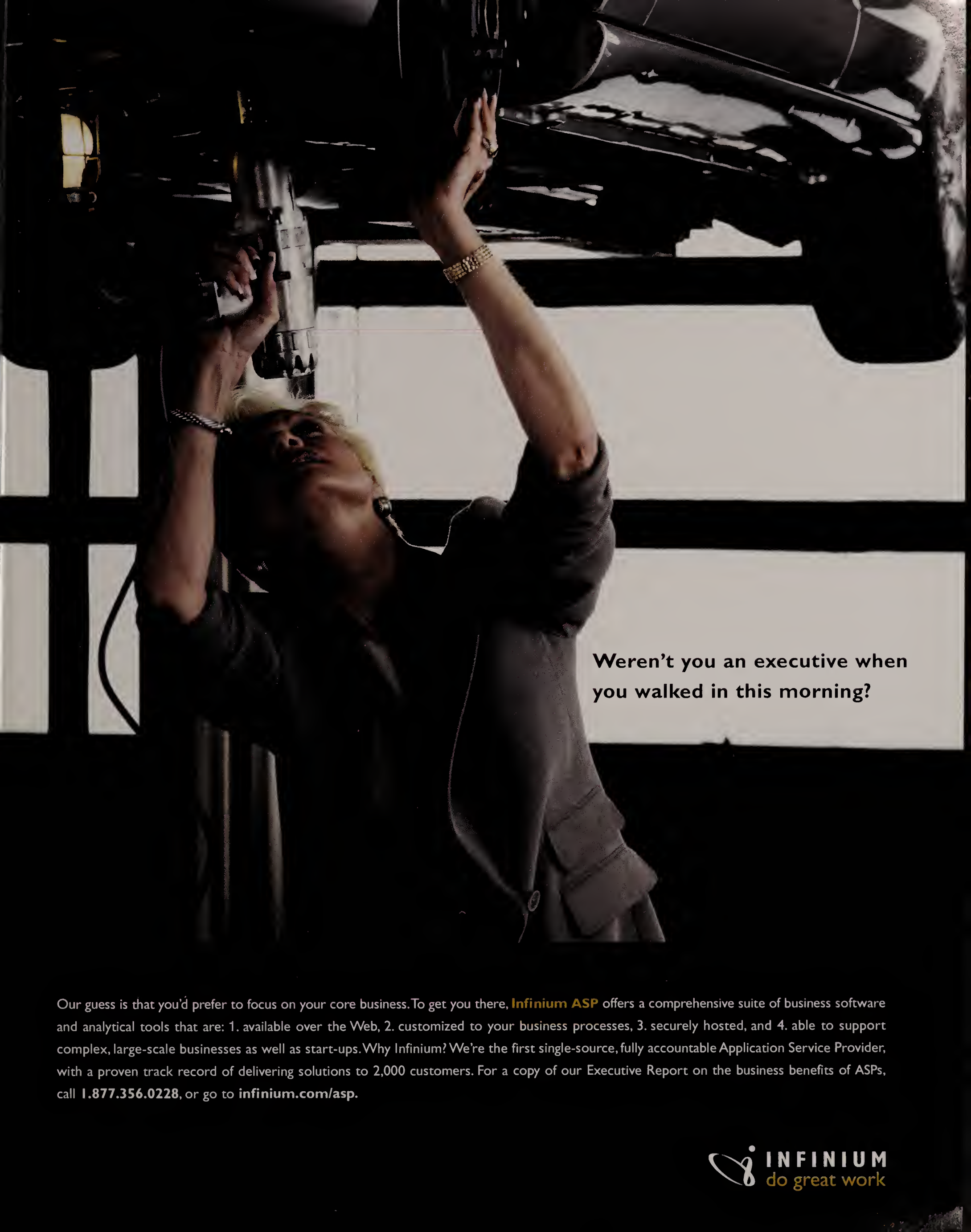
Are your students and staff tempted to drop out and take jobs in this hot IT market?

Yes, particularly out of undergrad computer science. The undergrads are dropping out after two years. I am also seeing that in my staff. And it's not just the money. Another piece is the IT environment. Academe used to be focused on cool new technology. Now, we have this core underpinning of a whole business, and the technology is running the enterprise 24 hours a day. There are challenges but it is basically routine and it takes a different mind-set than when your aim is developing the latest, coolest thing. **CIO**

How do you keep on the pulse of your constituents? Send e-mail to Senior Editor Cheryl Bentsen at cbentsen@cio.com.



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